

AD-A098 986

TETRA TECH INC PASADENA CA

F/6 13/10

COLUMBIA RIVER ENTRANCE CHANNEL DEEP-DRAFT VESSEL MOTION STUDY.--ETC(U)

SEP 80 S WANG, M KIMBLE, C BUTCHER, G D COX

DACW57-78-C-0028

UNCLASSIFIED

TETRAT-TC-3925-APP-B-K

NL

1 of 3

AD-A098 986



LEVEL III

①

COLUMBIA RIVER ENTRANCE
CHANNEL DEEP-DRAFT VESSEL
MOTION STUDY

FINAL REPORT

AD A098986

APPENDICES B, C, D, E, F, G, H, I, J, K

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DISTRIBUTION STATEMENT A

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SEPTEMBER 1980

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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20. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
Ship Motion, Water Wave Action on Ships, Approach Channels, Entrance Channels, Columbia River.		
21. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
A prototype ship motion monitoring program was initiated by the Portland District, U.S. Army Corps of Engineers to provide design criteria for the entrance channel at the mouth of the Columbia River. The contractor's field team boarded deep draft vessels bound to or from the Columbia River and measured vertical acceler- ation (heave), pitch, roll, yaw, and position as the vessels transited the 5-mile entrance channel. Twenty-nine vessels were monitored in the period May 1978- March 1979, and twenty-four in the period October 1979-April 1980.		

(OVER)

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

The final report details the field work data reduction processes, analyses, and results. The raw data is used to calculate vertical motions at the bow, stern, and side of the vessel, and the horizontal motion as the ship transits the entrance. This information is evaluated with respect to environmental conditions and the channel. Results of statistical analyses are shown for characteristics of individual transits, and long-range entrance usage.

Appendices A-K contain the tabulated and plotted motion data, environmental conditions, ship motion variables, and other information collected.

Accession For	
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APPENDIX B
INSTRUMENTATION SPECIFICATIONS

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QANTEX TAPE DRIVE SPECIFICATIONS

MEDIUM..... 3M DC 300A Data Cartridge

COMMANDS..... Write, Write Tape Mark, Erase, Read Forward, Read Reverse, Space Block Forward, Space Block Reverse, Space File Forward, Space File Reverse, Rewind, Unload and Eject.

COMMAND CHAINING.... Available for Read and Space Block Commands

DENSITY..... 1600 bpi, phase-encoded

TRANSFER RATE..... 6000 bytes per second at 30 inches per second

READ-WRITE SPEED.... 30 inches per second

REWIND & SEARCH
SPEED..... 90 inches per second

COMPATIBILITY..... ANSI & ECMA Standards

HEAD TYPE..... 4 track Read-After-Write

POWER..... 110V/60Hz or 105-235V/40-440Hz (Option 01)

SIZE..... 21"x17"x7½"

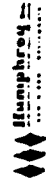
WEIGHT..... 29 lbs. (2710-1D), 34 lbs (2710-2D)

DATA CHECK..... Cyclic Redundancy Check Character

SPECIFICATIONS

01.0 GIMBAL FREEDOM
 1.1 INNER GIMBAL ±86° MINIMUM
 1.2 OUTER GIMBAL ±60° CONTINUOUS
 2.0 OUTPUT TAW
 2.1 PICKOFF POTENTIOMETER
 2.1.1 RESISTANCE 5000 OHMS ±10%
 2.1.2 POWER DISSIPATION 0.5 WATTS MAXIMUM
 3.0 SPIN MOTOR
 3.1 VOLTAGE 115 VAC ±10%, 400 HZ ±5%, 1 PHASE
 3.2 CURRENT 100 MA MAXIMUM STARTING, 65 MA MAXIMUM RUNNING
 3.3 TIME TO SPEED 2 MINUTES NOMINAL WITH 80% OF RATED VOLTAGE APPLIED
 4.0 PRECISION
 4.1 CURRENT 100 MA NOMINAL, INTERMITTENT INTERNALLY CONNECTED WITH MOTOR
 4.5.0 DRIFT
 5.1 SCORBY NOT MORE THAN 10°/HOUR (SCORBY DEFINED AS ALTERNATE CLOCKWISE AND COUNTERCLOCKWISE 27.5° ROLL, PITCH, AND YAW MOVEMENTS AT 6.0 CYCLES PER MINUTE)
 5.2 HEADING OUTPUT TO 0 - 359° ±1° (NON-SHORTING GAP IN POTENTIOMETER 1.0° TO 2.0°)
 6.0 INSULATION RESISTANCE 20 MEGOHMS, ELECTRICAL CIRCUITS TO CASE WITH 500 VDC APPLIED

7.0 ENVIRONMENTAL SPECIFICATIONS
 7.1 TEMPERATURE -60°F TO +165°F
 7.2 ALTITUDE -1000 FEET TO +40,000 FEET
 7.3 VIBRATION 5 TO 500 HZ, 0.036 INCH D.A. OR 5G WHICHEVER IS THE LIMITING VALUE
 7.4 HUMIDITY 0 - 95% RELATIVE HUMIDITY AT 90°F
 7.5 SEALING "O" RING, SEALED
 8.0 REMARKS
 8.1 ITEMS MARKED WITH (*) ARE CHECKED IN PRODUCTION TESTS. OTHER ITEMS FOR REFERENCE MAY BE CHECKED ON ORDER BY QUALIFICATION TESTS.
 8.2 INSTRUMENT WEIGHT 3.5 LBS.

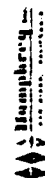


Electro-Mechanical
 Instruments

TITLE DEVELOPING DYNAMIC GYROSCOPE ON MOUNTING BASE		REV
DATE	0604-0901-1	REV
BY	C	REV
CHECKED	DATE	REV

2.0	MECHANICAL LIMITS	85° MINIMUM FREEDOM OF ROTATION ABOUT PITCH AXIS, 360° ABOUT ROLL AXIS	0°F TO +120°F -1000 TO 40,000 FT.
2.1	OUTPUT PICKOFF	POTENTIOMETER OUTPUT PROPORTIONAL TO ANGULAR DISPLACEMENT ABOUT THE ROLL AND PITCH AXIS.	5 TO 500 MΩ AT 0.016 D.A. ON 5G WHICHEVER IS LESS
2.2	ROLL ELECTRICAL DISPLACEMENT	150° 12"	20G ALL AXES TO ±1 MS
2.3	PITCH ELECTRICAL DISPLACEMENT	150° 12"	20 MΩ OHMS AT 50 VDC BETWEEN ISOLATED CIRCUITS AND CASE
2.4	RESISTANCE	5,000 ±5% OHMS	
2.5	RESOLUTION	0.2° MAXIMUM	
2.6	LINEARITY	0.5% OF FULL RANGE	FINISH ANODIZING, AND MOUNTING PLATE (STAINLESS STEEL)
2.7	POWER DISSIPATION	0.5 WATTS	WEIGHT 5 POUNDS MAXIMUM
2.8	CONTACT RESISTANCE	200 OHMS EQUIVALENT CONTACT RESISTANCE PER M.A.S. 710	SERVICE LIFE 500 HOURS
3.0	ELECTRICAL REQUIREMENTS	3L VDC ±20%	REMARKS
			ITEMS MARKED WITH (*) ARE CHECKED IN PRODUCTION TESTS. OTHER ITEMS FOR REFERENCE MAY BE CHECKED ON ORDER BY QUALIFICATION TESTS.

ITEMS MARKED WITH (*) ARE CHECKED IN PRODUCTION TESTS. OTHER ITEMS FOR REFERENCE MAY BE CHECKED ON ORDER BY QUALIFICATION TESTS.



ALL INFORMATION CONTAINED
HEREIN IS UNCLASSIFIED

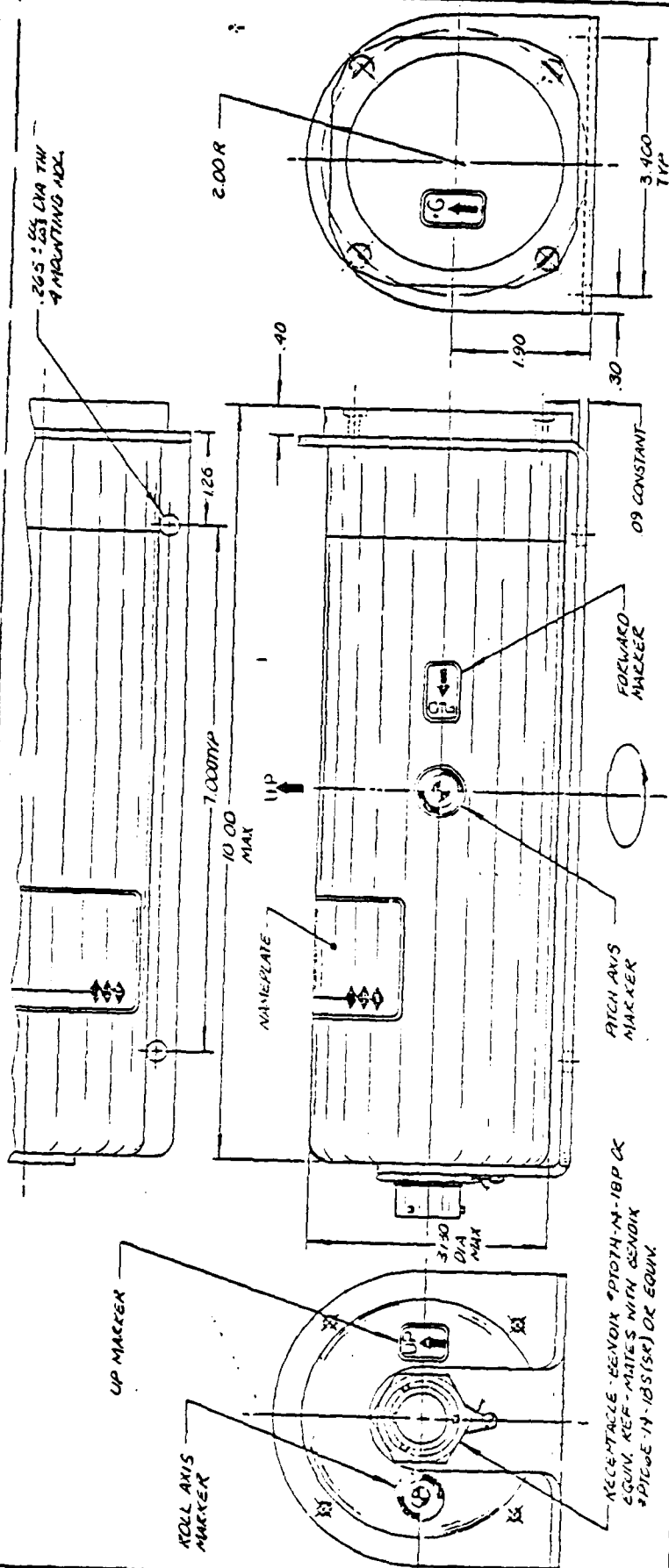
INVESTMENT BANKING
ACCELERATED
REVENUE STARTUP

200-0000

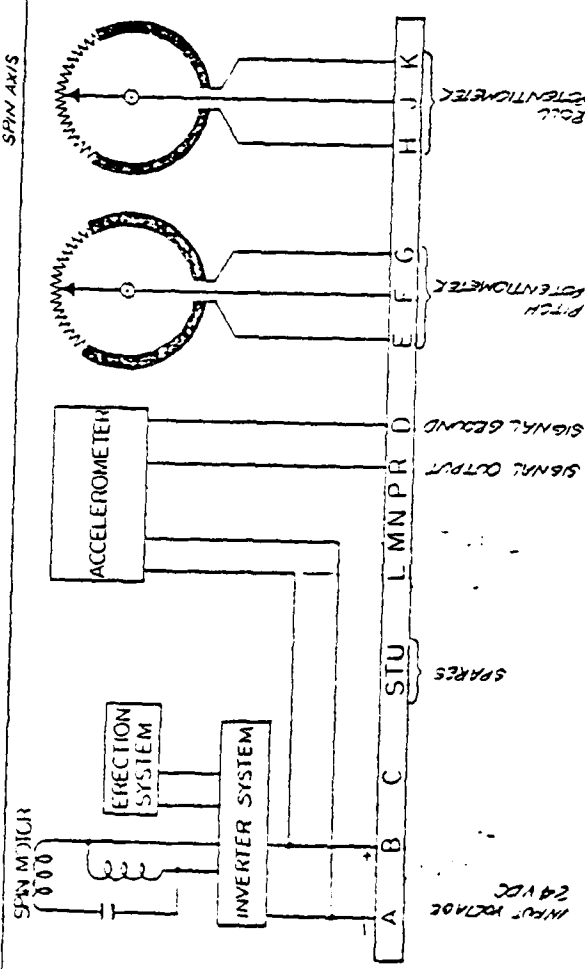
SPECIFICATIONS

4.1.0	MECHANICAL LIMITS	±85° MINIMUM FREEDOM OF ROTATION ABOUT PITCH AXIS, 360° ABOUT ROLL AXIS	6.0	ENVIRONMENTAL
2.0	OUTPUT		6.1	TEMPERATURE
2.1	PICKOFF	POTENTIOMETER OUTPUT PROPORTIONAL TO ANGULAR DISPLACEMENT ABOUT THE ROLL AND PITCH AXIS.	6.2	ALTITUDE
2.2	ROLL ELECTRICAL DISPLACEMENT	±50° ±2"	6.3	VIBRATION
2.3	PITCH ELECTRICAL DISPLACEMENT	±50° ±2"	6.4	SHOCK
2.4	RESISTANCE	5,000 ±5% OHMS	6.5	INSULATION RESISTANCE
2.5	RESOLUTION	0.2° MAXIMUM	6.6	FINISH
2.6	LINEARITY	0.5% OF FULL RANGE	6.7	WEIGHT
2.7	POWER DISSIPATION	0.5 WATTS	6.8	SERVICE LIFE
2.8	CONTACT RESISTANCE	200 OHMS EQUIVALENT CONTACT RESISTANCE PER N.A.S. 710	7.0	REMARKS
3.0	ELECTRICAL REQUIREMENTS		7.1	ITEMS MARKED WITH (*) ARE CHECKED IN PRODUCTION TESTS. OTHER ITEMS FOR REFERENCE MAY BE CHECKED ON ORDER BY QUALIFICATION TESTS.
3.1	VOLTAGE	24 VDC ±5%		
3.2	CURRENT	1.5 AMP NOMINAL		
4.0	SPIN MOTOR AND ERECTION SYSTEM THROUGH INTERNAL INVERTER			
4.1	VOLTAGE	115 VAC, 400 HZ, SINGLE PHASE		
4.2	CURRENT (RUNNING)	110 MA NOMINAL		
4.3	CURRENT (STARTING)	350 MA NOMINAL		
4.4	TIME TO SPEED	3 MINUTES MAXIMUM		
4.5	ERECTION RATES			
4.5.1	TIME TO ERECT	3 MINUTES MAXIMUM TO WITHIN 1.0° OF VERTICAL AFTER POWER IS APPLIED UNDER STATIC CONDITIONS. 6 MIN. DYNAMIC CONDITIONS.		
4.5.2	NOMINAL ERECTION RATE	ROLL 7°/MIN. PITCH 7°/MIN.		
4.5.3	VERTICAL ACCURACY	±0.2° OF TRUE VERTICAL		
5.0	ACCELEROMETER			
5.1	RANGE	±2.0G		
5.2	INPUT	24 VDC FROM INPUT VOLTAGE (INTERNALLY REGULATED)		
5.3	OUTPUT SENSITIVITY	2.50V/G		
5.4	ACCURACY (INCLUDING HYSTERESIS AND REPEATABILITY)	±0.1% OF FULL SCALE		
5.5	SELF TEST	CURRENT TORQUING CAPABILITY FOR CALIBRATION CHECK.		

Humphreys		ELECTRONICS AND INSTRUMENTS	
1700 LINDSEY DR. WILMINGTON, DE 19806		C 5403 C200-1	
REV. 2		REV. 2	



NOTE:
 1. NAMEPLATE AND ALL MARKERS, 0.010 MAX THICKNESS
 2. 0.010 MOVEMENT OF INSTRUMENT WHILE VIEWING PITCH AXIS MARKER, WILL RESULT IN A DECREASING RESISTANCE BETWEEN PINS F & G
 3. 0.010 MOVEMENT OF INSTRUMENT WHILE VIEWING ROLL AXIS MARKER, WILL RESULT IN A DECREASING RESISTANCE BETWEEN PINS H & J



Humphrey		ELECTRIC MECHANICAL INSTRUMENTS	
DATE	BY	DATE	BY
1964	1	1964	1
1965	2	1965	2
1966	3	1966	3
1967	4	1967	4
1968	5	1968	5
1969	6	1969	6
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1971	8	1971	8
1972	9	1972	9
1973	10	1973	10
1974	11	1974	11
1975	12	1975	12
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1977	14	1977	14
1978	15	1978	15
1979	16	1979	16
1980	17	1980	17
1981	18	1981	18
1982	19	1982	19
1983	20	1983	20
1984	21	1984	21
1985	22	1985	22
1986	23	1986	23
1987	24	1987	24
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1990	27	1990	27
1991	28	1991	28
1992	29	1992	29
1993	30	1993	30
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1998	35	1998	35
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2224	261	2224	261
2225	262	2225	262
2226	263	2226	263
2227	264	2227	264
2228	265	2228	265

APPENDIX C
SAMPLE DATA SHEET FROM VOYAGE NO. 9

Voyage 9Recorder CPage 1 / 10VOYAGE NO. 9

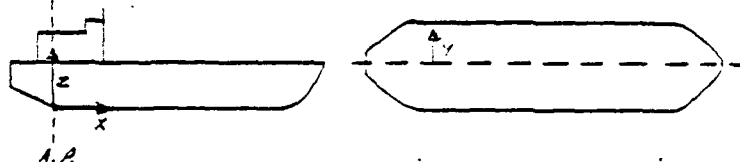
I. VOYAGE DESCRIPTION

Route: From Willapa Bay To RichmondDates: Depart 1515 3 Nov/28 Arrive 2345 5 Nov.Time Zone Description PST (2D+8)Tt Personnel Capt. L. J. Johnson Chris Butcher

II. VESSEL DESCRIPTION

Name CHEVRON WASHINGTON Type Oil CarrierCaptain Steve Alexander LBP 625'0"LOA 651'4" Breadth (Molded) 96'0"Draft: Fwd 23'0"Aft 30'0"Mean 28'6"Displacement 36,385 LT

III. CG AND SENSOR LOCATIONS



Motion Sensor

Mini Ranger R/T

Fathometer Transducer

LCB (from Hydrostat Data)

LCG (computed)

VCG (computed)

X	Y	Z	COMMENTS
103.4'	+3.25'	100.7'	on center - 343
93.8'	+1.25'	123.5'	on top railing of 1st deck - on radar mast
596'	-	-	transducer near bow
324.4'	-	-	
313.9	-	-	
-	-	22.6	

IV. BAR CROSSING

Date 4 November 1928Time 0856 - 0919Bar Pilot Capt. L. J. Johnson (J. H.)Pilot's Opinion of Crossing E 25V

Voyage 9
Recorder C
Page 2/10

TRANSIT LOG

Begin 0356 4 NOV/20 End 0919

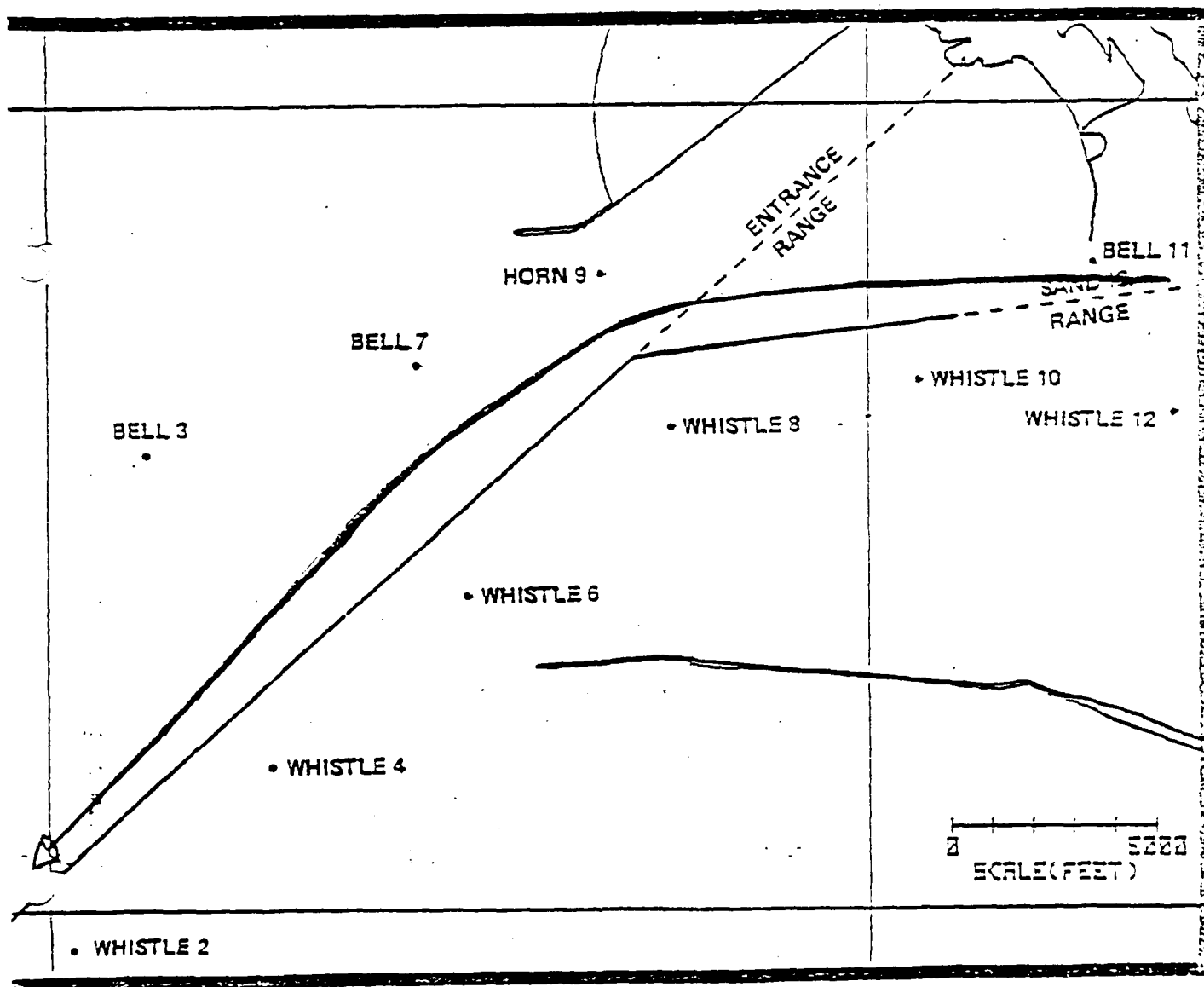
Bar Pilot Capt K. Mc ALPIN (No. 11) Opinion of Crossing Easy

Cassette:

Number 1 Side A

Start 033 Stop 071

Intended Track:



Voyage 9
Recorder C
Page 3/10

OBSERVATIONS

I. <u>TIDES</u>	<u>Time</u>	<u>Elevation (ft)</u>	<u>Time</u>	<u>Elevation (ft)</u>
Astoria(Tongue Point)	<u>0927</u>	<u>-2.4 Low</u>	<u>1519</u>	<u>+3.2 High</u>
Correction	<u>-1^h10^m</u>	<u>+0.1</u>	<u>-0^h46^m</u>	<u>-0.7</u>
Entrance(North Jetty)	<u>0817</u>	<u>+2.5 Low</u>	<u>1433</u>	<u>+3.0 High</u>
Corrections on Astoria:	High Water	<u>-0^h46^m</u>	<u>-0.7 ft.</u>	
	Low Water	<u>-1^h10^m</u>	<u>+0.1 ft.</u>	

II. <u>TIDAL CURRENTS</u>	<u>Time</u>	<u>Current (Kt)</u>	<u>Time</u>	<u>Current (Kt)</u>
Grays' Hbr. Entrance	<u>0628</u>	<u>2.4 Ebb</u>	<u>0922</u>	<u>Slack</u>
Correction	<u>+0^h20^m</u>	<u>+1.5</u>	<u>+0^h05^m</u>	<u>-</u>
Entrance (Buoy No. 12)	<u>0648</u>	<u>3.6 Ebb</u>	<u>0927</u>	<u>Slack</u>
Corrections on Gray's Hbr.	Slack Water	<u>+0^h05^m</u>		
	Max. Current	<u>+0^h20^m</u>	Flood Ratio 1.4	Ebb Ratio 1.5

III PRE-RUN OBSERVATIONS

Time: 0350
Weather: FAIR
Temperature: 43°F Visibility: UNLIMITED
Wind: NW 10-15 KNOTS
Sea State: Seas: NW WIND CHOP Swell NIL
1-2'

IV. POST-RUN OBSERVATIONS

Time: 0935
Weather: FAIR
Temperature: 56°F Visibility: UNLIMITED
Wind: NW 15 KNOTS
Sea State: Seas: NW Swell WINDWAVE
2-4' 10-12'
10 Kt

Voyage 9Recorder CBPage A / 10

OBSERVATIONS DURING RUN

NOTE: Observations are to be recorded approximately every 2 minutes or when course and/or speed changes or other noteworthy events occur.

TIME	SHIP					EVENT / COMMENT
	Course °T	Speed Kts	Pitch/RPM Ft/RPM	Humidity G/mg (°C)		
~~0857~~ 0856	275	14.2	16	278.8	3.8W	-----
0858	265	14.5	16	272	7W	-----
0900	253	14.8	16	258	5W	-----
0903	255	13.8	15	258.5	3.5W	-----
0905	230	—	—	235.4	5.4W	-----
0907	227	13.1	15.5	231.8	4.8W	-----
0909	220	13.2	15.5	222.4	2.4W	-----
0911	221	12.7	15	223	2W	-----
0913	218.5	12.4	15.5	219	1.5W	-----
0915	222	12.0	15	224.9	2.9W	-----
0918	220	13.1	15	221.8	1.8W	-----
STOP 0919.05						-----

1.15' to 0920

3.2' to 0920

Voyage 1Recorder 4Page 5 / 10

INSTRUMENT CHECK & CALIBRATION

	Pre-Run	Post-Run	Comments
I. TAPE HEADS			
Clean HP Tape Head	✓	-	
Clean Qantex Tape Head	✓	-	
II. PITCH			
Level	/	/	
+45° (Down by Bow)	/	/	
-45° (Down by Stern)	/	/	
III. ROLL			
Level	/	/	
+45° (To Port)	/	/	
-45° (To Starboard)	/	/	
IV. HEAVE			
Rest	/	/	
Positive Acc. (Up)	/	/	
Negative Acc. (Down)	/	/	
V. HEADING			
Time	0842	0930	Ship's Gyro Deviation: 1.2° E
Gyro (°T)	315.5	161.9	
Corrected Ship's Gyro (°T)	315.5	160.0	
Deviation	-0-	1.9° W	Drift Rate: 1.9° in 45m 0.04°/min - W
VI. MINI RANGER			
Byte Test Card Check	/	/	New Station @ CMC 5. Leds OK
VII. SYSTEM TEST			
Record on Qantex & Playback	/	/	
VIII. OBTAIN COURSE/RUDDER ANGLE RECORD		/	
IX. OBTAIN FATHOMETER RECORD		/	

11/4/78
PAGE C/10

VOY #9 PRE RUN CHECK

Pitch= 000.0deg
Roll= -000.3deg
Accel= 1.003Gs
Hdng= 255.7deg
A Rng=??????yds
B Rng=??????yds
Time: 00:07:21

Pitch= 045.5deg
Roll= 008.6deg
Accel= 1.003Gs
Hdng= 255.4deg
A Rng=??????yds
B Rng=??????yds
Time: 00:07:37

Pitch= -045.3deg
Roll= -002.9deg
Accel= 1.003Gs
Hdng= 255.3deg
A Rng=??????yds
B Rng=??????yds
Time: 00:07:52

Pitch= 001.1deg
Roll= 044.7deg
Accel= 1.005Gs
Hdng= 254.9deg
A Rng=??????yds
B Rng=??????yds
Time: 00:08:16

Pitch= -002.9deg
Roll= -046.1deg
Accel= 1.003Gs
Hdng= 254.8deg
A Rng=??????yds
B Rng=??????yds
Time: 00:08:24

Pitch= 001.1deg
Roll= -011.4deg
Accel= 1.628Gs
Hdng= 253.8deg
A Rng=??????yds
B Rng=??????yds
Time: 00:09:16

Pitch= 014.9deg
Roll= 012.2deg
Accel= -0.295Gs
Hdng= 253.5deg
A Rng=??????yds
B Rng=??????yds
Time: 00:09:29

VOYAGE # 9

PRE RUN EQUIPMENT CHECK

VOY #9 QUANTON PLAYBACK
PRE RUN

Pitch= 000.0deg
Roll= -000.3deg
Accel= 0.999Gs
Hdng= 246.8deg
A Rng=??????yds
B Rng=??????yds
Time: 00:14:30 EOT

Pitch= 000.0deg
Roll= -000.3deg
Accel= 1.000Gs
Hdng= 246.2deg
A Rng=??????yds
B Rng=??????yds
Time: 00:15:27 EOT

VOY #9 TAPE PLAYBACK
PRE RUN

11/4/76
 PAGE 2/10

POST RUN CHECK VOYAGE#9

VOYAGE # 9

POST RUN EQUIPMENT CHECK

Pitch= 001.1deg
 Roll= 000.9deg
 Accel= 0.943Gs
 Hdng= 189.1deg
 A Rng=016742yds
 B Rng=014136yds
 Time: 09:39:05

Pitch= 045.4deg
 Roll=-002.2deg
 Accel= 0.994Gs
 Hdng= 189.4deg
 A Rng=016742yds
 B Rng=014364yds
 Time: 09:39:40

Pitch=-044.3deg
 Roll=-001.5deg
 Accel= 1.059Gs
 Hdng= 189.0deg
 A Rng=016742yds
 B Rng=014444yds
 Time: 09:39:54

Pitch=-001.6deg
 Roll= 044.3deg
 Accel= 0.951Gs
 Hdng= 189.1deg
 A Rng=016742yds
 B Rng=014506yds
 Time: 09:40:04

Pitch= 000.8deg
 Roll=-045.4deg
 Accel= 1.003Gs
 Hdng= 189.7deg
 A Rng=016742yds
 B Rng=014553yds
 Time: 09:40:11

Pitch=-005.6deg
 Roll= 000.4deg
 Accel= 1.314Gs
 Hdng= 189.5deg
 A Rng=016999yds
 B Rng=014645yds
 Time: 09:40:25

Pitch= 015.2deg
 Roll= 025.6deg
 Accel=-0.207Gs
 Hdng= 189.9deg
 A Rng=016999yds
 B Rng=014633yds
 Time: 09:40:30

EDITED TAPE RESULTS

VOYAGE# 9

4 scans at
 090945

6 scans at
 090946

4 scans at
 090947

6 scans at
 090948

4 scans at
 090949

6 scans at
 090950

4 scans at
 090951

file mark

POST RUN TAPE RUN BACK
 VOYAGE# 9

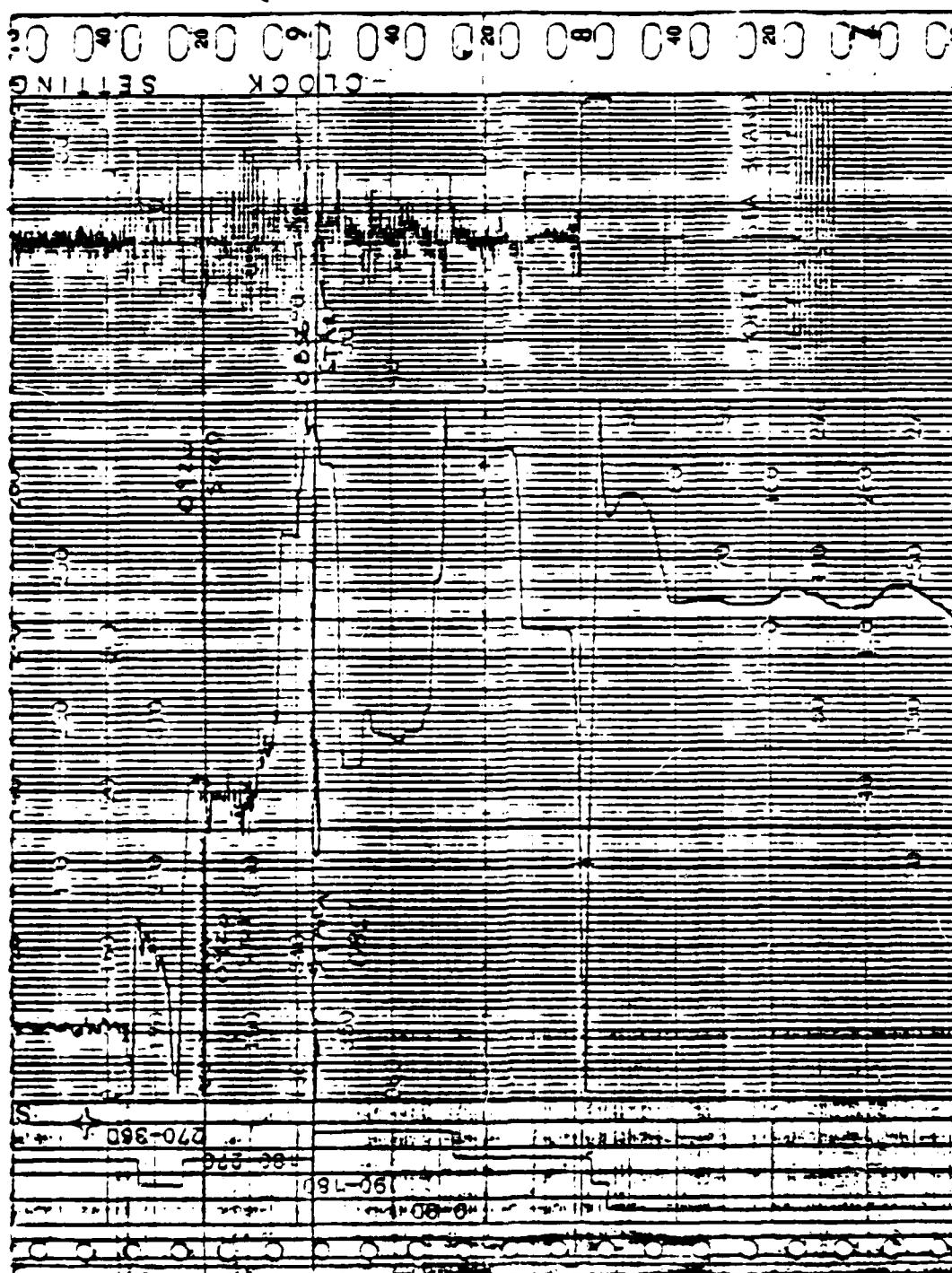
Pitch= 000.1deg
 Roll=-000.9deg
 Accel= 1.003Gs
 Hdng= 279.0deg
 A Rng=009273yds
 B Rng=002490yds
 Time: 08:56:00

Pitch= 000.4deg
 Roll= 000.5deg
 Accel= 0.958Gs
 Hdng= 216.1deg
 A Rng=015345yds
 B Rng=009855yds
 Time: 09:19:02

EOT

COURSE & RUDDER ANGLE RECORD

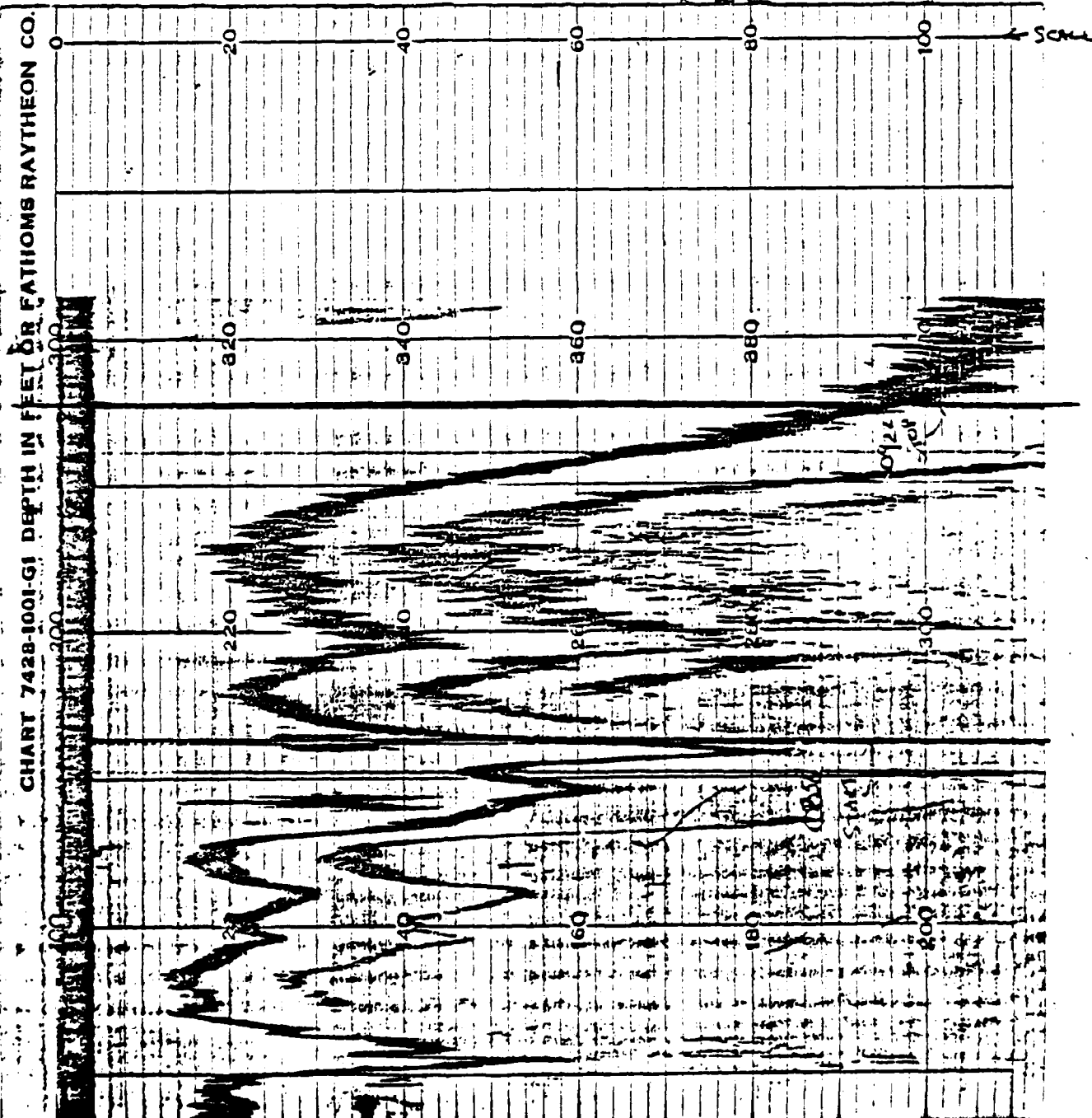
VOYAGE NO. 9



FATHOMETER RECORD

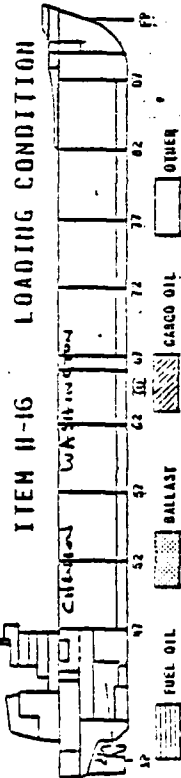
Voyage No. 9

SOUNDINGS IN
FT. BELOW KEEL



CLASS FORM

35000 DWT GAS TURBINE TANKER ITEM H-16 LOADING CONDITION



LOAD CONDITION: BALLAST MAX. SHEAR: MAX. BENDING: VULCAN No. 9

CARGO

NO.	CU.	24S	101S	VCO	WM	LCG	LM	WHS
1	P/S	—	—	—	—	227.5	—	—
2	P/S	—	—	—	—	172.1	—	—
3	P/S	51.0	—	—	—	119.0	—	—
4	P/S	31.5	—	—	—	57.3	—	—
5	P/S	—	—	—	—	—	—	—
6	P/S	—	—	—	—	—	—	—
7	P/S	—	—	—	—	—	—	—
8	P/S	—	—	—	—	—	—	—
9	P/S	—	—	—	—	—	—	—
10	P/S	—	—	—	—	—	—	—
TOTAL		82.5	—	—	—	—	—	—

CONSUMABLES

ITEM	24S	101S	VCO	WM	LCG	LM	WHS
1	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—
3	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—
5	—	—	—	—	—	—	—
6	—	—	—	—	—	—	—
7	—	—	—	—	—	—	—
8	—	—	—	—	—	—	—
9	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—
TOTAL	—	—	—	—	—	—	—

NOTES:
LENGTH BETWEEN PERPENDICULARS IS 625.00 FT.
LONGITUDINAL LEVERS ARE FROM MIDSHIP (+ FWD).
VERTICAL LEVERS ARE FROM HOLD BASELINE.
WHS IN FT-101S.
F.S. CORN = 2 WHS/DISPL.
P = LIQUID DENSITY IN BBL./CU. SEE NOTES IN ITEM 6-5.
IN VALVE COLUMNS INDICATE WHETHER SOURCE VALVE IS OPEN (O) OR SHUT (S).

BALLAST

TANK	LCG	WM	VCO	101S	WHS
FORE PEAK	—	—	—	—	—
FWD DEEP	—	—	—	—	—
1 P/S	—	—	—	—	—
2 P/S	—	—	—	—	—
3 P/S	—	—	—	—	—
4 P/S	—	—	—	—	—
5 P/S	—	—	—	—	—
6 P/S	—	—	—	—	—
7 P/S	—	—	—	—	—
8 P/S	—	—	—	—	—
9 P/S	—	—	—	—	—
10 P/S	—	—	—	—	—
AFTER PEAK	—	—	—	—	—
TOTAL	—	—	—	—	—

SUMMARY

ITEM	LCG	WM	VCO	101S	WHS
CARGO	—	—	—	—	—
BALLAST	—	—	—	—	—
CONSUMABLES	—	—	—	—	—
TOTAL DWT	—	—	—	—	—
LIQUID SHIP	—	—	—	—	—
TOTAL DISPL.	—	—	—	—	—

DR

APPENDIX D
SUMMARY OF STABILITY CRITERION FOR PHASE II VOYAGES*

*Computed from available information provided
by the ship's engineering officers

SUMMARY OF STABILITY CRITERION
(Phase II Only)

VOYAGE NUMBER	TRANSVERSE METACENTRIC HEIGHT GM_T (ft)	LONGITUDINAL METACENTRIC HEIGHT GM_L (ft)
30	12.3	922.8
31	21.9	1126.0
32	7.3	798.3
33	14.7	989.3
34	12.9	957.5
35	4.4	893.2
36	2.7	675.1
37	14.0	1098.6
38	17.9	1039.9
39	12.2	913.8
40	21.0	1104.0
41	2.7	891.3
42	3.3	649.6
43	7.6	880.1
44	8.3	922.3
45	15.2	956.6
46	11.5	948.6
47	4.3	865.3
48	7.7	926.5
49 ^Δ	--	---
50	15.2	930.2
51	2.5	648.7
52	6.3	821.4
53	18.6	1027.3

Δ Data unavailable

APPENDIX E

MONTHLY SUMMARIES OF WEATHER OBSERVATIONS AT CLATSOP
COUNTY AIRPORT, ASTORIA, OREGON

MAY, 1978 - JUNE, 1978

NOVEMBER, 1978 - MARCH, 1979

OCTOBER, 1979 - APRIL, 1980

CLATSOP COUNTY AIRPORT

MONTHLY SUMMARY



HISTORIN, OREGON

LATITUDE 40° 00' N LONGITUDE 125° 53' W (ELEVATION 1000000) 0 FT. STIMULUS TIME US(0) SACIFIC WGAN 004224

JSCOMM--NORR. ASHEVILLE 30/23/79

JUNE 1978
ASTORIA, OREGON
NATIONAL WEATHER SERVICE OFC
CLATSOP COUNTY AIRPORT

Local Climatological Data

MONTHLY SUMMARY



LATITUDE 46° 08' N LONGITUDE 123° 53' W ELEVATION (GROUND) 877' STANDARD TIME ZONE PACIFIC ZONE 08-224

DATE	TEMPERATURE °F			DEGREE DAYS		WINDY DAYS IN PAST 24 HRS	WINDY DAYS IN PAST 24 HRS		PRECIPITATION INCHES	PRECIPITATION INCHES		WIND DIRECTION	WIND DIRECTION		SUNSHINE HOURS	SUNSHINE HOURS		SEA STATE FOOT	SEA STATE FOOT	
	MIN	MAX	MEAN	HEAT	COLD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	62	47	55	10	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	60	50	55	4	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	60	52	56	4	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	70	53	59	10	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	70	58	64	18	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	68	59	63	7	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	68	54	62	7	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	60	40	50	3	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	63	52	58	2	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	63	52	58	2	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	68	51	60	4	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	62	50	56	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	62	50	56	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	62	50	56	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	62	50	56	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	62	50	56	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	70	46	58	1	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	55	46	51	4	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	57	40	50	1	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	67	46	57	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	66	54	60	3	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	54	52	58	1	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	57	50	58	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	67	40	57	1	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	67	53	60	2	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	60	52	56	3	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	70	47	59	5	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	57	51	54	1	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	57	57	57	4	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	60	54	57	3	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

JUNE 1978

ASTORIA, OREGON

SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM	SUM
2033	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520
400	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
57.91	51.2	59.4	52.3	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1	52.1
NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS
400	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
400	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
400	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
400	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
400	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
* ALSO IN AN EARLIER DATE, OR DATES.
* HEAVY FOG - VISIBILITY 1/4 MILE OR LESS.
* FIGURES FOR WIND DIRECTIONS ARE TENS IF DEGREES CLOSER TO TRUE NORTH - 10 = 100.
* DATA IN COLS. 4 AND 12-15 ARE BASED ON 1-HR.

NOTE: OBSERVATIONS PER DAY AT 1-HOUR INTERVALS.
FASTEST WIND SPEEDS ARE FASTEST OBSERVED ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE "X" WITH THE DIRECTION INDICATES PERM. JUST SPEED.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

SUMMARY BY HOURS									
TIME	TEMP	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND
01	51	30	05	54	42	51	50	5	2
02	50	30	05	53	51	50	50	4	2
03	50	30	05	53	51	50	50	4	2
04	50	30	05	53	51	50	50	4	2
05	50	30	05	53	51	50	50	4	2
06	50	30	05	53	51	50	50	4	2
07	50	30	05	53	51	50	50	4	2
08	50	30	05	53	51	50	50	4	2
09	50	30	05	53	51	50	50	4	2
10	50	30	05	53	51	50	50	4	2
11	50	30	05	53	51	50	50	4	2
12	50	30	05	53	51	50	50	4	2
13	50	30	05	53	51	50	50	4	2
14	50	30	05	53	51	50	50	4	2
15	50	30	05	53	51	50	50	4	2
16	50	30	05	53	51	50	50	4	2
17	50	30	05	53	51	50	50	4	2
18	50	30	05	53	51	50	50	4	2
19	50	30	05	53	51	50	50	4	2
20	50	30	05	53	51	50	50	4	2
21	50	30	05	53	51	50	50	4	2
22	50	30	05	53	51	50	50	4	2
23	50	30	05	53	51	50	50	4	2
24	50	30	05	53	51	50	50	4	2
25	50	30	05	53	51	50	50	4	2
26	50	30	05	53	51	50	50	4	2
27	50	30	05	53	51	50	50	4	2
28	50	30	05	53	51	50	50	4	2
29	50	30	05	53	51	50	50	4	2
30	50	30	05	53	51	50	50	4	2

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)									
TIME	PRECIP	PRECIP	PRECIP	PRECIP	PRECIP	PRECIP	PRECIP	PRECIP	PRECIP
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
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21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

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 Daniel R. Mitchell
 DIRECTOR, NATIONAL CLIMATIC CENTER
 JSCORP--NOAA--ASHVILLE 57/78/78 250

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

NOTES

CEILING
LIFE : 1000-1000 1000-1000

NEGATIVE

- | | |
|----|------------------|
| 0 | FORWARD |
| 1 | FREEZE/STORM |
| 2 | SQUALL |
| 3 | RAIN |
| 4 | RAIN SHOWERS |
| 5 | FREEZING RAIN |
| 6 | DRIZZLE |
| 7 | FREEZING DRIZZLE |
| 8 | SNOW |
| 9 | SNOW PELLETS |
| 10 | ICE CRYSTALS |
| 11 | SNOW SHOWERS |
| 12 | SNOW GRAINS |
| 13 | ICE PELLETS |
| 14 | WIND |
| 15 | FOG |
| 16 | ICE FOG |
| 17 | GROUND FOG |
| 18 | BLowing DUST |
| 19 | BLowing SAND |
| 20 | BLowing SNOW |
| 21 | BLowing SPRAY |
| 22 | SMOKE |
| 23 | HAZE |
| 24 | JUST |

4100

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTED IN TENS OF DEGREES FROM TRUE NORTH: 10... 19 FOR EAST, 19 FOR SOUTH, 27 FOR WEST, ENTRY OF 30 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS;
MULTIPLY BY 1.15 TO CONVERT
TO MILES PER HOUR.

STATION
CATONIA TRECUM

70 70

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FEDERAL BUILDING
ASHEVILLE, N.C. 29801

29

NOVEMBER 1978 ASTORIA, OREGON

SUMMARY BY HOURS

WHERE OBSERVATIONS PER DAY AT 3-MINUTE INTERVALS.
FASTEST WIND AND SPEEDS ARE FASTEST OBSERVED
ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS
OF DEGREES. THE "X" WITH THE DIRECTION INDICATES
PEAK SURF SPEED.
ANY SMOGGS DETECTED WILL BE INDICATED AND
CHANGES IN SURFAC DATA WILL BE INDICATED BY
THE APPROPRIATE SYMBOLS.

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)USCORN--NORR--ASHEVILLE 12/28/78 290

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

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8S SNOW
9S SNOW PELLETS
1C ICE CRYSTALS
1C SNOW SNOWIES
1G SNOW GEMS
1P ICE PELLETS
4 HAIL
F FOG
F ICE FOG
2F DRIZZLING FOG
90 BLUING DUST
94 BLUING SAND
95 BLUING SNOW
9T BLUING SPENT
A SNORE
H NOSE
J JEST

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DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TERMS OF DEGREES FROM TRUE NORTH: 01-09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS;
MULTIPLY BY 1.15 TO CONVERT
TO MILES PER HOUR.

STATION
ASTORIA JACOBSON

YEAR & MONTH

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE

COM-210



FIRST CLASS

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

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DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TENS OF DEGREES FROM TRUE NORTH: 10 FOR EAST, 0 FOR SOUTH, 20 FOR WEST. ENTRY OF 0 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS  
MULTIPLY BY 1.67 TO CONVERT  
TO MILES PER HOUR.

STATION  
ASTORIA OREGON

YEAR 6 CONTINUED  
 TO 12

U.S. DEPARTMENT OF COMMERCE  
NATIONAL CLIMATIC CENTER  
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ASHEVILLE, N.C. 28901

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U.S. DEPARTMENT OF COMMERCE

COM-210



FIRST CLASS

CLATSOP COUNTY AIRPORT

### MONTHLY SUMMARY



Latitude 40° 20' N Longitude 123° 43' W Elevation 1000 meters 071 Standard Time 1400 Pacific 100000 00-224

JANUARY 1979

# ASTORIA, OREGON

[illegible][illegible][illegible]

ALL OBSERVATIONS ARE SET AT 1-MINUTE INTERVALS.  
FASTEST WIND AND SPEEDS ARE FASTEST OBSERVED  
20-MINUTE VALUES AND WIND DIRECTION ARE A 15-  
DEGREE. WE WITH THE DIRECTION INDICATES  
ARE JUST SPEED.  
ALL READINGS REPORTED WILL BE CORRECTED AND  
CHANGES IN SUMMARY DATA WILL BE INDICATED IN  
THE MONTHLY SUMMARY

SUMMARY BY TOPICS

[illegible]

WORLD PRESS PUBLICATION DATE: 12/1/1971

[illegible]

SUBSCRIPTION PRICE: \$2.55 PER YEAR INCLUDING MAIL AND POSTAGE. FOREIGN MAILING BY AIR. SINGLE COPIES 10 CENTS FOR ORDERS TO ANNUAL ISSUE. THERE IS A MINIMUM ORDER OF \$2.00 FOR ALL ORDERS. UNPAID ISSUES OF JOURNAL ORDERS ARE NOT REORDERED. IN THE DEPARTMENT OF COMMERCE, WASHINGTON, D.C. 20540.

[illegible]

**noaa** NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ENVIRONMENTAL DATA AND INFORMATION SERVICE

*Daniel R. Mitchell*  
DIRECTOR, NATIONAL SCIENTIFIC CENTER

USCJNM - HQNM - AMELVILLE 23/07/79 250

### OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

WQ 1 E 5

**CEILING**  
WOOD, PLASTERED WITH POP AND

SECRET

|    |                  |
|----|------------------|
| 0  | UNKNOWN          |
| 1  | UNKNOWN FORM     |
| 2  | SQUALL           |
| 3  | RAIN             |
| 44 | RAIN SHOWERS     |
| 49 | FREEZING RAIN    |
| 50 | DRIZZLE          |
| 51 | FREEZING DRIZZLE |
| 52 | SNOW             |
| 53 | SNOW PELLETS     |
| 54 | ICE CRYSTALS     |
| 55 | SNOW SHOWERS     |
| 56 | SNOW GRUINS      |
| 57 | ICE PELLETS      |

## 2146

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: 00... 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS;  
MULTIPLY BY 1.15 TO CONVERT  
TO MILES PER HOUR.

STAFFING

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AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID  
U.S. DEPARTMENT OF COMMERCE

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FIRST CLASS

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NATIONAL CLIMATIC CENTER  
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NATIONAL CLIMATIC CENTER  
FEDERAL BUILDING  
ASHEVILLE, N.C. 28801

NATIONAL WEATHER SERVICE OFC  
CLATSOP COUNTY AIRPORT

## Local Climatological Data



### MONTHLY SUMMARY

LATITUDE 48° 00' N LONGITUDE 123° 53' W ELEVATION 16000 FT. STATION TIME USED PACIFIC 1500 00-324

FEBRUARY 1979

ASTORIA, OREGON

| DATE           | TEMPERATURE |      |         |            | WIND      |       | WIND DIRECTION |       | WIND SPEED |       | WIND DIRECTION |       | WIND SPEED |       | WIND DIRECTION |       | WIND SPEED |       | WIND DIRECTION |       | WIND SPEED |                |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
|----------------|-------------|------|---------|------------|-----------|-------|----------------|-------|------------|-------|----------------|-------|------------|-------|----------------|-------|------------|-------|----------------|-------|------------|----------------|--|----------------|--|----------------|--|------------------|--|----------------|--|----------------|--|----------------|--|----------------|--|----------------|--|----------------|--|
|                | MAX         | MIN  | AVERAGE | WIND CHILL | DIRECTION | SPEED | DIRECTION      | SPEED | DIRECTION  | SPEED | DIRECTION      | SPEED | DIRECTION  | SPEED | DIRECTION      | SPEED | DIRECTION  | SPEED | DIRECTION      | SPEED | DIRECTION  |                |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
|                |             |      |         |            |           |       |                |       |            |       |                |       |            |       |                |       |            |       |                |       |            |                |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 1              | 34          | 21   | 28      | -14        | 18        | 37    | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 2              | 35          | 18   | 27      | -15        | 20        | 38    | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 3              | 37          | 31   | 34      | -6         | 32        | 31    | 0              | 1     | 6          | 1.23  | 0              | 30    | 28         | 08    | 2,51           | 3,81  | 21         | 37    | 10             | 10    | 10         | 10             |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 4              | 47          | 35   | 41      | -2         | 40        | 24    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 5              | 46          | 43   | 44      | 3          | 48        | 18    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 6              | 46          | 42   | 44      | 3          | 47        | 18    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 7              | 46          | 34   | 41      | -2         | 38        | 24    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 8              | 53          | 42   | 48      | 5          | 44        | 17    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 9              | 46          | 38   | 42      | 1          | 43        | 21    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 10             | 46          | 40   | 43      | 1          | 43        | 20    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 11             | 50          | 45   | 48      | 4          | 46        | 17    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 12             | 58          | 46   | 51      | 7          | 47        | 14    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 13             | 52          | 31   | 42      | -2         | 38        | 23    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 14             | 45          | 27   | 36      | -3         | 30        | 28    | 0              | 2     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 15             | 45          | 33   | 39      | -6         | 34        | 28    | 0              | 2     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 16             | 46          | 37   | 42      | -2         | 37        | 23    | 0              | 4     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 17             | 51          | 38   | 45      | 1          | 44        | 20    | 0              | 3     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 18             | 50          | 38   | 45      | 1          | 41        | 20    | 0              | 3     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 19             | 44          | 34   | 42      | -2         | 38        | 23    | 0              | 3     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 20             | 49          | 34   | 42      | -2         | 38        | 23    | 0              | 3     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 21             | 47          | 38   | 42      | -2         | 38        | 23    | 0              | 3     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 22             | 44          | 37   | 43      | -1         | 38        | 23    | 0              | 3     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 23             | 46          | 38   | 43      | -1         | 38        | 23    | 0              | 1     | 4          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 24             | 53          | 38   | 46      | 2          | 43        | 18    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 25             | 54          | 43   | 48      | 5          | 46        | 18    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 26             | 47          | 42   | 45      | 1          | 42        | 20    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 27             | 50          | 35   | 43      | -1         | 38        | 23    | 0              | 1     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 28             | 48          | 28   | 38      | -6         | 36        | 28    | 0              | 1     | 4          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0     | 0              | 0     | 0          | 0              |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| SUM            | SUM         | SUM  | SUM     | SUM        | SUM       | SUM   | SUM            | SUM   | SUM        | SUM   | SUM            | SUM   | SUM        | SUM   | SUM            | SUM   | SUM        | SUM   | SUM            | SUM   | SUM        | SUM            |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 1234           | 1234        | 1234 | 1234    | 1234       | 1234      | 1234  | 1234           | 1234  | 1234       | 1234  | 1234           | 1234  | 1234       | 1234  | 1234           | 1234  | 1234       | 1234  | 1234           | 1234  | 1234       | 1234           |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| AVG            | AVG         | AVG  | AVG     | AVG        | AVG       | AVG   | AVG            | AVG   | AVG        | AVG   | AVG            | AVG   | AVG        | AVG   | AVG            | AVG   | AVG        | AVG   | AVG            | AVG   | AVG        | AVG            |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| 47.6           | 29.3        | 41.9 | -1.1    | 38         | 42        | 2     | 0              | 1     | 0          | 1.23  | 0              | 30    | 28         | 08    | 2,51           | 3,81  | 21         | 37    | 10             | 10    | 10         | 10             |  |                |  |                |  |                  |  |                |  |                |  |                |  |                |  |                |  |                |  |
| NUMBER OF DAYS |             |      |         |            |           |       |                |       |            |       |                |       |            |       |                |       |            |       |                |       |            | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS   |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  |
| NUMBER OF DAYS |             |      |         |            |           |       |                |       |            |       |                |       |            |       |                |       |            |       |                |       |            | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS   |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  | NUMBER OF DAYS |  |
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SUMMARY BY HOURS

| Date | Time | Lat | Long | Alt | Wind |     | Temp | Humid | Vis | Clouds | Sea | Remarks |
|------|------|-----|------|-----|------|-----|------|-------|-----|--------|-----|---------|
|      |      |     |      |     | Dir  | Spd |      |       |     |        |     |         |
| 21   | 01   | 28  | 02   | 41  | 30   | 20  | 21   | 15    | 5   | 5      | 5   |         |
| 22   | 01   | 28  | 00   | 41  | 30   | 30  | 21   | 10    | 5   | 5      | 5   |         |
| 23   | 01   | 28  | 01   | 41  | 30   | 30  | 21   | 10    | 5   | 5      | 5   |         |
| 24   | 01   | 28  | 03   | 43  | 41   | 30  | 21   | 10    | 5   | 5      | 5   |         |
| 25   | 01   | 28  | 02   | 43  | 43   | 30  | 21   | 10    | 5   | 5      | 5   |         |
| 26   | 01   | 28  | 01   | 43  | 43   | 30  | 21   | 10    | 5   | 5      | 5   |         |
| 27   | 01   | 28  | 01   | 43  | 41   | 30  | 21   | 10    | 5   | 5      | 5   |         |
| 28   | 01   | 28  | 02   | 42  | 43   | 30  | 21   | 10    | 5   | 5      | 5   |         |

## HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

[illegible]

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*Daniel R. Mitchell*  
DIRECTOR, NATIONAL CLIMATIC CENTER

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02 NOV 74

### OBSERVATIONS AT 3-HOUR INTERVALS

| HOUR | TEMPERATURE |     |     |     | WIND |       |     |       | TEMPERATURE |     |     |     | WIND |       |     |       | TEMPERATURE |     |     |     | WIND |       |     |       |
|------|-------------|-----|-----|-----|------|-------|-----|-------|-------------|-----|-----|-----|------|-------|-----|-------|-------------|-----|-----|-----|------|-------|-----|-------|
|      | MAX         | MIN | Avg | REL | DIR  | SPEED | DIR | SPEED | MAX         | MIN | Avg | REL | DIR  | SPEED | DIR | SPEED | MAX         | MIN | Avg | REL | DIR  | SPEED | DIR | SPEED |
| 01   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 02   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 03   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 04   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 05   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 06   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 07   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 08   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 09   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 10   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 11   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 12   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 13   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 14   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 15   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 16   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 17   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 18   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 19   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 20   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 21   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 22   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 23   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 24   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 25   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 26   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 27   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 28   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 29   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 30   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 31   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 32   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 33   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 34   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 35   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 36   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 37   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 38   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 39   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 40   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 41   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 42   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 43   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 44   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 45   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 46   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 47   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 48   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 49   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 50   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 51   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 52   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 53   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 54   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 55   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 56   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 57   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 58   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 59   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 60   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 61   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 62   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 63   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 64   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 65   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 66   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 67   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 68   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 69   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |
| 70   | 10          | 10  | 10  | 10  | 00   | 0     | 0   | 0     | 25          | 27  | 27  | 17  | 00   | 12    | 1   | 0     |             |     |     |     |      |       |     |       |

NOTES

CEILING

U.S. 1 100-400-0000 100-400-0000

## WEATHER

- 0 DOWNPOD  
 1 DOWNPODS DOWN  
 2 SQUALL  
 3 RAIN  
 4 RAIN SHOWERS  
 5 FREEZING RAIN  
 6 DRIZZLE  
 7 FREEZING DRIZZLE  
 8 SNOW  
 9 SNOW PELLETS  
 0 ICE CRYSTALS  
 1 SNOW SHOWERS  
 2 SNOW DRIBBLES  
 3 ICE PELLETS  
 4 HAIL  
 5 FOG  
 6 ICE FOG  
 7 DRIZZLING FOG  
 8 BLIZZING JUST  
 9 BLIZZING SNOW  
 0 BLIZZING SNOW  
 1 BLIZZING SPOOF  
 2 SNOW  
 3 HAZE  
 4 DUST

41 NO

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TEAS OF DEGREES FROM TRUE NORTH. E IS FOR EAST, S FOR SOUTH, W FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS.  
MULTIPLY BY 1.85 TO CONVERT  
TO MILES PER HOUR.

STATION

\* 2000年 4月 20日 11:00

45 FEB 18 1967

30 02

AN EQUAL OPPORTUNITY EMPLOYER

RECEIVED AND FILED  
U. S. DEPARTMENT OF JUSTICE

COM-210



FIRST CLASS

U.S. DEPARTMENT OF COMMERCE  
NATIONAL CLIMATIC CENTER  
FEDERAL BUILDING  
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

CLATSOP COUNTY AIRPORT

### MONTHLY SUMMARY



LATITUDE 40° 09' N LONGITUDE 123° 53' W (ELEVATION 1000000) 8 FT. STANDARD TIME USED: PACIFIC ZONE 06-224

**MARCH 1979**

**ASTORIA, OREGON**

[illegible][illegible][illegible][illegible]

SUMMARY 97 -COURS

| Run | Time | Speed | Time |      | Speed |      | Time |      | Speed |      |
|-----|------|-------|------|------|-------|------|------|------|-------|------|
|     |      |       | 1st  | 2nd  | 1st   | 2nd  | 1st  | 2nd  | 1st   | 2nd  |
| 1   | 1:10 | 10.0  | 1:10 | 10.0 | 1:10  | 10.0 | 1:10 | 10.0 | 1:10  | 10.0 |
| 2   | 1:15 | 9.5   | 1:15 | 9.5  | 1:15  | 9.5  | 1:15 | 9.5  | 1:15  | 9.5  |
| 3   | 1:20 | 9.0   | 1:20 | 9.0  | 1:20  | 9.0  | 1:20 | 9.0  | 1:20  | 9.0  |
| 4   | 1:25 | 8.5   | 1:25 | 8.5  | 1:25  | 8.5  | 1:25 | 8.5  | 1:25  | 8.5  |
| 5   | 1:30 | 8.0   | 1:30 | 8.0  | 1:30  | 8.0  | 1:30 | 8.0  | 1:30  | 8.0  |
| 6   | 1:35 | 7.5   | 1:35 | 7.5  | 1:35  | 7.5  | 1:35 | 7.5  | 1:35  | 7.5  |
| 7   | 1:40 | 7.0   | 1:40 | 7.0  | 1:40  | 7.0  | 1:40 | 7.0  | 1:40  | 7.0  |
| 8   | 1:45 | 6.5   | 1:45 | 6.5  | 1:45  | 6.5  | 1:45 | 6.5  | 1:45  | 6.5  |
| 9   | 1:50 | 6.0   | 1:50 | 6.0  | 1:50  | 6.0  | 1:50 | 6.0  | 1:50  | 6.0  |
| 10  | 1:55 | 5.5   | 1:55 | 5.5  | 1:55  | 5.5  | 1:55 | 5.5  | 1:55  | 5.5  |

[illegible]

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 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| 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 |
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James L. ...  
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### OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

## NOTES

CEILING

DATE: 1980-04-10 TIME: 14:00

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DIRECTIONS ARE THOSE FROM WHICH WE WIND GLIMS. NO. OF WINDS OF DEGREES FROM THE NORTH. 0 TO 9 FOR EAST. 0 TO 90 FOR SOUTHWEST. 0 TO 9 FOR WEST. 0 TO 90 FOR THE SOUTHEAST. NO. OF GLIMS EACH.

WINDS ARE EXPRESSED IN HOURS. 0 TO 24 HOURS. 0 TO 24 HOURS PER HOUR.



1990 4 126 4 126 1 29 19 29.0

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

CELESTINE

THE UNIVERSITY OF CHICAGO

FEATHER

- | | |
|----|------------------|
| 8 | TORNADO |
| 9 | THUNDERSTORM |
| 0 | SQUALL |
| 1 | RAIN |
| 2M | RAIN SHOWERS |
| 3 | FREEZING RAIN |
| 4 | DRIZZLE |
| 5L | FREEZING DRIZZLE |
| 6 | SNOW |
| 7S | SNOW PELLETS |
| 8 | ICE CRYSTALS |
| 9C | SNOW SHOWERS |
| 0G | SNOW GRAINS |
| 1 | ICE PELLETS |
| 2 | HAIL |
| 3 | FOG |
| 4F | ICE FOG |
| 5 | DRAWN FOG |
| 6D | BLOWING DUST |
| 7 | BLOWING SAND |
| 8 | BLOWING SNOW |
| 9T | BLOWING SPRAY |
| 0 | SMOKE |
| 1 | HAZE |
| 2 | MIST |

END

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TENS OF DEGREES FROM TRUE NORTH: 1.E.E. 09 FOR EAST. 1.S FOR SOUTH. 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS;
MULTIPLY BY 1.6 TO CONVERT
TO MILES PER HOUR.

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE

COM-210



FIRST CLASS

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASTENVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

CLATSOP COUNTY AIRPORT

MONTHLY SUMMARY



ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA

[illegible]

* EXTREME FOR THE MONTH - LAST OCCURRENCE F
MORE THAN ONE
* RACE AMOUNT
* ALSO ON AN EARLIER DATE, OR DATES.
HEAVY FOG: - VISIBILITY 1/4 MILE OR LESS.
FIGURES FOR WIND DIRECTIONS ARE TENS IF DE-
GREES CLOCKWISE FROM TRUE NORTH 30 = CALM.
DATA IN COLS. 4 AND 12-15 ARE BASED ON 1" R

MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
FASTEST HILL WIND SPEEDS ARE FASTEST OBSERVED
ONE-MINUTE VALUES WHEN DIRECTIONS ARE A FEW
DEGREES THE WITH THE DIRECTION INDICATES
PEAK JUST SPEED.
ANY ERRORS DETECTED WILL BE CORRECTED AND
CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN
THE ANNUAL SUMMARY

SUMMARY BY -OURS

TEMPERATURE										WIND	
VELOCITY										DIRECTION	
INSTR. TIME	TEMP. AIR	TEMP. SURF	TEMP. COVER	TEMP. WATER	TEMP. SOIL	TEMP. WIND	RELATIVE HUMIDITY	WIND SPEED	WIND DIRECTION	WIND VELOCITY	WIND DIRECTION
27	91.0	57.1	44.1	42.1	39.1	36.1	41.1	3.1	41.1	3.1	41.1
28	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
29	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
30	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
31	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
32	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
33	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
34	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
35	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
36	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
37	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
38	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
39	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
40	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
41	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
42	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
43	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
44	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
45	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
46	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
47	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
48	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
49	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
50	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
51	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
52	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
53	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
54	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
55	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
56	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
57	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1
58	91.0	56.1	43.1	41.1	38.1	34.1	40.1	3.1	40.1	3.1	40.1

HOURLY PRECIPITATION WATER EQUIVALENT IN INCHES

[illegible]

DESCRIPTION OF THE 92 55 PER YEAR INCLUDING ANNUAL SUMMARY FOREIGN TRAVELING BY 35 EXTRA SINGLE COPY TO IDENTIFY AND MONITOR TO ANNUAL 1500 WHERE
A MINIMUM DEDUCTIBLE OF \$2 00 FOR EACH ORDER OF THE PUBLISHED ISSUES OF PUBLICATIONS MAY BE DEDUCTIBLE TO DETERMINE THE DEDUCTIBLE
PAYMENTS, DEBTS, AND LIABILITIES TO NATIONAL IN MATTER CENTER FEDERAL BUILDING, WASHINGTON, D.C. 20540, AND MAY 1980

NOTES: (1) THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AND IS DERIVED FROM RECORDS IN THE NATIONAL CLIMATE CENTER, ASHEVILLE, NORTH CAROLINA 28901.

noaa

NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATIONENVIRONMENTAL DATA AND
RECOMMENDATION 1994-95

Lewis - 48-48
 Thompson - 48-48

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	LAT	LONG	WIND DIRECTION SPEED MILES PER HOUR	VISI- BILITY MILES	TEMPERATURE					WIND					WIND DIRECTION SPEED MILES PER HOUR	VISI- BILITY MILES	TEMPERATURE					WIND					WIND DIRECTION SPEED MILES PER HOUR	VISI- BILITY MILES	TEMPERATURE					WIND																								
					AIR	SEA	SURF	WIND DIRECTION SPEED MILES PER HOUR	WIND DIRECTION SPEED MILES PER HOUR									AIR	SEA	SURF	WIND DIRECTION SPEED MILES PER HOUR								WIND DIRECTION SPEED MILES PER HOUR										AIR	SEA	SURF	WIND DIRECTION SPEED MILES PER HOUR	WIND DIRECTION SPEED MILES PER HOUR															
01	31	10	10	10	42	42	40	89	07	4	10	45	0	DAY 31	01	31	10	54	46	37	53	11	1	10	22	4	DAY 33	01	31	10	52	51	50	93	11	5	51	50	50	93	11	5																
02	31	10	10	10	42	41	39	89	19	7	10	35	0	DAY 32	02	31	10	54	46	37	53	11	1	10	22	4	DAY 33	02	31	10	52	51	50	93	11	5	51	50	50	93	11	5																
03	31	10	10	10	43	41	39	83	07	4	10	25	0	DAY 34	03	31	10	51	47	43	74	11	1	10	25	4	DAY 36	03	31	10	52	51	50	93	11	5	51	50	50	93	11	5																
04	31	10	10	10	54	47	39	57	11	8	10	70	5	DAY 35	04	31	10	54	51	49	82	12	10	28	10	4	DAY 37	04	31	10	54	52	51	90	10	6	54	52	51	90	10	6																
05	31	10	10	10	58	49	40	51	10	11	10	35	5	DAY 38	05	31	10	57	51	45	64	11	1	10	28	5	DAY 40	05	31	10	58	55	52	81	09	10	58	55	52	81	09	10																
06	31	10	10	10	56	48	40	58	10	5	10	40	5	DAY 41	06	31	10	56	48	40	58	10	5	10	40	5	DAY 42	06	31	10	56	48	40	58	10	5	56	48	40	58	10	5																
07	31	10	10	10	53	47	40	62	12	10	10	23	4	DAY 43	07	31	10	52	51	50	93	10	8	9	10	5	DAY 44	07	31	10	53	52	51	93	10	6	53	52	51	93	10	6																
08	31	10	10	10	53	46	38	57	12	10	10	14	7	DAY 45	08	31	10	52	51	50	93	12	10	10	55	10	DAY 46	08	31	10	52	50	49	90	10	6	52	50	49	90	10	6																
09	31	10	10	10	51	49	47	88	09	6	10	50	10	DAY 47	09	31	10	51	49	48	90	07	3	7	80	10	DAY 48																															
10	31	10	10	10	50	47	45	83	11	8	10	30	10	DAY 49	10	31	10	50	47	45	83	11	8	10	30	10	DAY 50																															
11	31	10	10	10	50	40	47	89	07	5	10	22	0	DAY 51	11	31	10	50	40	48	90	09	7	8	30	15	DAY 52																															
12	31	10	10	10	53	51	51	90	12	5	10	140	5	DAY 53	12	31	10	54	52	50	96	15	6	5	150	5	DAY 54																															
13	31	10	10	10	51	52	51	93	18	5	10	140	5	DAY 55	13	31	10	57	52	47	69	08	7	7	250	5	DAY 56																															
14	31	10	10	10	55	53	52	90	15	6	10	250	5	DAY 57	14	31	10	56	52	45	75	06	8	7	250	5	DAY 58																															
15	31	10	10	10	51	50	50	96	11	6	10	150	5	DAY 59	15	31	10	52	49	47	63	08	8	10	250	5	DAY 60																															
16	31	10	10	10	49	48	48	96	11	4	10	75	0	DAY 61	16	31	10	54	50	46	73	07	6	7	100	5	DAY 62																															
17	31	10	10	10	51	49	48	96	11	4	10	75	0	DAY 63	17	31	10	50	49	48	93	11	4	10	12	3	DAY 64																															
18	31	10	10	10	51	47	42	71	05	5	10	100	5	DAY 65	18	31	10	46	45	43	69	04	6	10	10	3	DAY 66																															
19	31	10	10	10	53	48	44	72	04	5	10	100	5	DAY 67	19	31	10	42	41	43	63	06	6	10	10	3	DAY 68																															
20	31	10	10	10	51	47	43	62	05	5	10	140	5	DAY 69	20	31	10	36	36	35	56	12	4	2	10	3	DAY 70																															
21	31	10	10	10	48	47	43	62	05	5	10	140	5	DAY 71	21	31	10	54	50	46	75	12	4	2	10	3	DAY 72																															
22	31	10	10	10	42	52	43	50	06	12	10	100	5	DAY 73	22	31	10	54	50	46	75	12	4	2	10	3	DAY 74																															
23	31	10	10	10	52	54	46	56	08	9	10	250	5	DAY 75	23	31	10	55	51	48	77	22	9	2	100	5	DAY 76																															
24	31	10	10	10	55	50	46	72	05	6	10	28	0	DAY 77	24	31	10	52	50	48	66	14	3	3	100	5	DAY 78																															
25	31	10	10	10	44	43	42	53	00	3	10	28	0	DAY 79	25	31	10	50	49	48	63	11	4	10	12	3	DAY 80																															
26	31	10	10	10	51	49	47	88	09	6	10	50	10	DAY 81	26	31	10	46	45	43	69	04	6	10	10	3	DAY 82																															
27	31	10	10	10	50	47	45	83	11	8	10	30	10	DAY 83	27	31	10	37	37	37	50	11	3	2	10	3	DAY 84																															
28	31	10	10	10	50	40	47	89	07	5	10	22	0	DAY 85	28	31	10	48	45	42	80	08	6	2	10	3	DAY 86																															
29	31	10	10	10	53	51	51	90	12	5	10	140	5	DAY 87	29	31	10	54	50	46	75	12	4	2	10	3	DAY 88																															
30	31	10	10	10	51	52	51	93	18	5	10	140	5	DAY 89	30	31	10	57	52	47	69	08	7	7	250	5	DAY 90																															
31	31	10	10	10	55	53	52	90	15	6	10	250	5	DAY 91	31	31	10	56	52	45	75	06	8	7	250	5	DAY 92																															
32	31	10	10	10	51	50	50	96	11	6	10	150	5	DAY 93	32	31	10	52	49	47	63	08	8	10	250	5	DAY 94																															
33	31	10	10	10	49	48	48	96	11	4	10	75	0	DAY 95	33	31	10	54	50	46	73	07	6	7	100	5	DAY 96																															
34	31	10	10	10	51	49	48	96	11	4	10	75	0	DAY 97	34	31	10	50	49	48	93	11	4	10	12	3	DAY 98																															
35	31	10	10	10	51	47	42	71	05	5	10	100	5	DAY 99	35	31	10	46	45	43	69	04	6	10	10	3	DAY 100																															
36	31	10	10	10	53	48	44	72	04	5	10	100	5	DAY 101	36	31	10	36	36	35	56	12	4	2	10	3	DAY 102																															
37	31	10	10	10	42	52	43	50	06	12	10	100	5	DAY 103	37	31	10	54	50	46	75	12	4	2	10	3	DAY 104																															
38	31	10	10	10	52	54	46	56	08	9	10	250	5	DAY 105	38	31	10	55	51	48	77	22	9	2	100	5	DAY 106																															
39	31	10	10	10	55	50	46	72	05	6	10	28	0	DAY 107	39	31	10	52	50	48	66	14	3	3	100	5	DAY 108																															
40	31	10	10	10	44	43	42	53	00	3	10	28	0	DAY 109	40	31	10	50	49	48	63	11	4	10	12	3	DAY 110																															
41	31	10	10	10	51	49	47	88	09	6	10	50	10	DAY 111	41	31	10	46	45	43	69	04	6	10	10	3	DAY 112																															
42	31	10	10	10	50	47	45	83	11	8	10	30	10	DAY 113	42	31	10	37	37	37	50	11	3	2	10	3	DAY 114																															
43	31	10	10	10	50	40	47	89	07	5	10	22	0	DAY 115	43	31	10	48	45	42	80	08	6	2	10	3	DAY 116																															
44	31	10	10	10	53	51	51	90	12	5	10	140	5	DAY 117	44	31	10	54	50	46	75	12	4	2	10	3	DAY 118																															
45	31	10	10	10	51	52	51	93	18	5	10	140	5	DAY 119	45	31	10	57	52	47	69	08	7	7	250	5	DAY 120																															
46	31	10	10	10	55	53	52	90	15	6	10	250	5	DAY 121	46	31	10	56	52	45	75	06	8	7	250	5	DAY 122																															
47	31	10	10	10	51	50	50	96	11	6	10	150	5	DAY 123	47	31	10	52	49	47	63	08	8	10	250	5	DAY 124																															
48	31	10	10	10	49	48	48	96	11	4	10	75	0	DAY 125	48	31	10	54	50	46	73	07	6	7	100	5	DAY 126																															
49	31	10	10	10	51	49	48	96	11	4	10	75	0	DAY 127	49	31	10	50	49	48	93	11	4	10	12	3	DAY 128																															
50	31	10	10	10	51	47	42	71	05	5	10	100	5	DAY 129	50	31	10	46	45	43	69	04	6	10	10	3	DAY 130																															
51	31	10	10	10	53	48	44	72	04	5	10	100	5	DAY 131	51	31	10	36	36	35	56	12	4	2	10	3	DAY 132																															
52	31	10	10	10	42	52	43	50	06	12	10	100	5	DAY 133	52	31	10	54	50	46	75	12	4	2	10	3	DAY 134																															
53	31	10	10	10	52	54	46	56	08	9	10	250	5	DAY 135	53	31	10	55	51	48	77	22	9	2	100	5	DAY 136																															
54	31	10	10	10	55	50	46	7																																																		

NOTES

CEILING
JHL INDICATES JHL IN FEET

WEATHER

8	FOAMADO
7	THUNDERSTORM
6	SQUALL
5	RAIN
4M	RAIN SHOWERS
3R	FREEZING RAIN
2L	DRIZZLE
1L	FREEZING DRIZ
	SNOW
SP	SNOW PELLETS
	ICE CRYSTALS
SG	SNOW SHOWERS
SW	SNOW/RAINS
P	ICE PELLETS
	HAIR
F	FOG
	ICE FOG
3F	GROUND FOG
30	BLOWING DUST
8M	BLOWING SAND
05	BLOWING SNOW
AT	BLOWING SPRAY
	SPOKE
	HAZE
0	DUST

41 NO

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS, INDICATED IN TERMS OF DEGREES FROM TRUE NORTH: 12, 30 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS.
MULTIPLY BY 1.15 TO CONVERT
TO MILES PER HOUR.

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE

COM-210



FIRST CLASS

DECEMBER 1979
ASTORIA, OREGON
NATIONAL WEATHER SERVICE OF
CLATSOP COUNTY AIRPORT

Local Climatological Data

MONTHLY SUMMARY



LATITUDE 46° 09' N LONGITUDE 123° 53' W ELEVATION (GROUND) 3 FT STANDARD TIME USED: PACIFIC HAN 494224

DATE	TEMPERATURE °F				DEGREE DAYS BASE 65°		WEATHER TYPES IN DATES OF OCCURRENCE	SNOW DEPTH IN	PRECIPITATION IN		WIND DIRECTION	SUNSHINE PERCENT		SKY COVER TENTHS
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEPARTURE	HEATING DEGREE DAYS			WATER EQUIVA- LENT	SNOW WATER EQUIVA- LENT		PERCENT OF POSSIBLE	SUNSHINE TO POSSIBLE	
1	55	39	47	1	42	19	0	0	0	0	0	0	0	0
2	53	42	48	4	44	11	0	0	0	0	0	0	0	0
3	53	45	54	0	49	11	0	0	0	0	0	0	0	0
4	57	38	48	4	45	7	0	0	0	0	0	0	0	0
5	53	38	46	2	44	19	0	0	0	0	0	0	0	0
6	53	47	50	5	48	15	0	0	0	0	0	0	0	0
7	52	41	47	3	46	18	0	0	0	0	0	0	0	0
8	52	40	46	2	45	19	0	0	0	0	0	0	0	0
9	57	41	49	5	45	6	0	0	0	0	0	0	0	0
10	49	31	40	-4	33	25	0	0	0	0	0	0	0	0
11	49	31	40	-3	39	25	0	0	0	0	0	0	0	0
12	50	39	45	2	40	20	0	0	0	0	0	0	0	0
13	54	43	49	5	48	6	0	0	0	0	0	0	0	0
14	54	51	53	0	51	2	0	0	0	0	0	0	0	0
15	55	43	49	5	50	5	0	0	0	0	0	0	0	0
16	54	43	49	5	39	6	0	0	0	0	0	0	0	0
17	54	50	55	2	51	3	0	0	0	0	0	0	0	0
18	58	50	54	1	51	3	0	0	0	0	0	0	0	0
19	56	47	52	3	51	3	0	0	0	0	0	0	0	0
20	55	47	51	3	47	14	0	0	0	0	0	0	0	0
21	50	37	44	2	41	21	0	0	0	0	0	0	0	0
22	46	34	40	-2	36	25	0	0	0	0	0	0	0	0
23	44	38	41	-1	35	24	0	0	0	0	0	0	0	0
24	51	42	47	5	40	18	0	0	0	0	0	0	0	0
25	53	41	47	5	43	18	0	0	0	0	0	0	0	0
26	56	37	47	5	44	18	0	0	0	0	0	0	0	0
27	58	33	46	4	35	19	0	0	0	0	0	0	0	0
28	48	44	46	5	35	19	0	0	0	0	0	0	0	0
29	52	43	48	7	38	17	0	0	0	0	0	0	0	0
30	48	43	46	5	38	19	0	0	0	0	0	0	0	0
31	55	47	51	0	46	14	0	0	0	0	0	0	0	0

SUM	SUM	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
549	286	540	540	540	540	540	540	540	540	540	540	540	540	540	540
AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG
53.2	41.5	47.4	4.5	43	4.9	0	0	0	0	0	0	0	0	0	0
NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS	NUMBER OF DAYS
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAXIMUM °F	MINIMUM °F	MAXIMUM °F	MINIMUM °F	MAXIMUM °F	MINIMUM °F	MAXIMUM °F	MINIMUM °F	MAXIMUM °F	MINIMUM °F	MAXIMUM °F	MINIMUM °F	MAXIMUM °F	MINIMUM °F	MAXIMUM °F	MINIMUM °F
58	31	58	31	58	31	58	31	58	31	58	31	58	31	58	31
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

* EXTREME FOR THE MONTH - LAST OCCURRENCE
* MORE THAN ONE.
* TRACE AMOUNT.
* ALSO IN AN EARLIER DATE, IN DATES.
* HEAVY FOG - VISIBILITY 1/4 MILE OR LESS.
* FIGURES FOR WIND DIRECTIONS ARE TENS OF DE-
GREES CLOCKWISE FROM TRUE NORTH 10 = CALM
DATA 4 COLS. 5 AND 2-5 ARE BASED ON 1/2 HR

* MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
* FASTEST MILE WIND SPEEDS ARE FASTEST OBSERVED
ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS
OF DEGREES. THE WITH THE DIRECTION INDICATES
PEAK WIND SPEED.
* ANY ERRORS DETECTED WILL BE CORRECTED AND
CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN
THE ANNUAL SUMMARY

SUMMARY BY HOURS

AVERAGES											RESULTANT WIND
TEMPERATURE											
WIND DIRECTION	WIND SPEED	WIND THERM	WIND THERM	WIND THERM	WIND THERM	WIND THERM	WIND THERM	WIND THERM	WIND THERM	WIND THERM	DIRECTION
37	31	30	231	46	44	42	37	37	37	37	37
34	31	30	221	46	44	42	36	37	37	37	37
31	31	30	21	46	44	43	31	37	37	37	37
21	31	30	231	46	44	44	36	37	37	37	37
21	31	30	21	5	49	44	31	37	37	37	37
61	31	30	221	5	49	44	31	37	37	37	37
31	31	30	21	46	44	43	36	37	37	37	37
21	31	30	21	46	44	43	36	37	37	37	37

HOURLY PRECIPITATION - WATER EQUIVALENT IN INCHES

DATE	HOURLY PRECIPITATION											
	1	2	3	4	5	6	7	8	9	10	11	12
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0

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NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

ENVIRONMENTAL DATA AND
INFORMATION SERVICE

David E. Williams
DIRECTOR, NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

NOAA-NMFS-ASHEVILLE

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

NOTES
CEILING
ONE ASSURES ANOTHER

HEATHER

1 THUNDER
2 THUNDERSTORM
3 SQUALL
4 RAIN
5 RAIN SHOWERS
6 FREEZING RAIN
7 DRIZZLE
8 FREEZING DRIZZLE
9 SNOW
10 SNOW PELLETS
11 ICE CRYSTALS
12 SNOW SHOWERS
13 SNOW DRAINS
14 ICE PELLETS
15 HAIL
16 FOG
17 ICE FOG
18 THUNDER FOG
19 BLOWING DUST
20 BLOWING SAND
21 BLOWING SNOW
22 BLOWING SMOKE
23 SMOKE
24 HAZE
25 DUST

WIND
DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TERMS OF DEGREES FROM TRUE NORTH: 0 FOR EAST, 90 FOR SOUTH, 180 FOR WEST. ENTRY OF 0 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS. MULTIPLY BY .5 TO CONVERT TO MILES PER HOUR.

SPEED IS EXPRESSED IN KNOTS
MULTIPLY BY 1.67 TO CONVERT
TO MILES PER HOUR

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATE CENTER
FEDERAL BUILDING
ASHBURN, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U. S. DEPARTMENT OF COMMERCE

COM-210



FIRST CLASS

JANUARY 1980 ASTORIA, OREGON

242



ASTORIA, OREGON JANUARY 1980

LATITUDE 46° 09' N LONGITUDE 123° 53' W ELEVATION (GROUND) 9 FT. STANDARD TIME USED: PAC. FIC. 10 JAN 1962

DATE	TEMPERATURE °F				DEW POINT		WIND		WEATHER TYPES ON DATES OF OCCURRENCE		PRECIPITATION		STATION		WIND				SUNSHINE		DAY COVER																				
	MAXIMUM	MINIMUM	AVERAGE	ON PARTIAL F NIGHT MINIMUM	AVERAGE	HEATING IN SHAD	HEATING IN SHAD	COOLING IN SHAD	1 FOG 2 HEAVY FOG 3 HAZE 4 MIST 5 SMOKE 6 SPRAY 7 DUST 8 FOG 9 HEAVY FOG 10 ICE 11 ICE 12 ICE 13 ICE 14 ICE 15 ICE 16 ICE 17 ICE 18 ICE 19 ICE 20 ICE 21 ICE 22 ICE 23 ICE 24 ICE 25 ICE 26 ICE 27 ICE 28 ICE 29 ICE 30 ICE	WATER EQUIVALENT	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND																				
																						1 FOG 2 HEAVY FOG 3 HAZE 4 MIST 5 SMOKE 6 SPRAY 7 DUST 8 FOG 9 HEAVY FOG 10 ICE 11 ICE 12 ICE 13 ICE 14 ICE 15 ICE 16 ICE 17 ICE 18 ICE 19 ICE 20 ICE 21 ICE 22 ICE 23 ICE 24 ICE 25 ICE 26 ICE 27 ICE 28 ICE 29 ICE 30 ICE																			
1	55	42	49	7	48	16	3	0	0	85	0	0	0	0	0	0	0	0	0	0	0	0																			
2	56	43	50	8	49	17	3	0	0	21	0	0	0	0	0	0	0	0	0	0	0																				
3	54	43	49	8	49	16	3	0	0	06	0	0	0	0	0	0	0	0	0	0	0																				
4	53	37	45	2	40	20	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0																				
5	53	46	50	7	41	19	0	0	0	75	0	0	0	0	0	0	0	0	0	0	0																				
6	53	44	49	6	45	16	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0																				
7	49	39	44	1	42	21	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0																				
8	55	38	47	4	37	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																				
9	50	37	44	3	35	21	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0																				
0	56	33	45	1	35	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																				
1	56	33	45	1	34	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																				
2	51	31	41	-3	35	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																				
3	44	40	42	-2	38	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																				
4	40	31	36	-9	31	29	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0																				
5	41	33	37	-7	34	28	0	0	0	46	0	0	0	0	0	0	0	0	0	0	0																				
6	48	38	43	-1	35	22	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0																				
7	54	41	48	4	42	17	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0																				
8	52	46	50	5	47	18	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0																				
9	48	43	46	2	40	19	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0																				
0	49	43	41	-3	40	24	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0																				
1	51	32	42	-2	37	23	0	2	0	31	0	0	0	0	0	0	0	0	0	0	0																				
2	54	39	47	3	40	19	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0																				
3	55	43	49	5	42	16	0	0	0	01	0	0	0	0	0	0	0	0	0	0	0																				
4	57	47	52	8	44	13	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0																				
5	55	48	52	9	48	13	0	0	0	92	0	0	0	0	0	0	0	0	0	0	0																				
6	54	50	57	13	55	8	0	0	0	55	0	0	0	0	0	0	0	0	0	0	0																				
7	51	52	57	13	53	8	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0																				
8	55	44	50	5	47	15	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0																				
9	56	41	49	5	44	15	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0																				
SUM																						SUM		SUM		SUM		SUM		SUM		SUM		SUM		SUM		SUM		SUM	
520																						57		529		529		529		529		529		529		529		529			
AVG																						AVG		AVG		AVG		AVG		AVG		AVG		AVG		AVG		AVG			
52.5																						40.2		46.4		46.4		46.4		46.4		46.4		46.4		46.4		46.4			
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52.5																						40.2		46.4		46.4		46.4		46.4		46.4		46.4		46.4		46.4			
52.5																						40.																			

R EXTREME FOR THE MONTH - LAST OCCURRENCE: 3
MORE THAN ONE.
* TRACE AMOUNT
* ALSO IN AN EARLIER DATE, OR DATES.
HEAVY FOG: - VISIBILITY 1/4 MILE OR LESS.
FIGURES FOR WIND DIRECTION ARE TENS OF DE-
GREES CLOCKWISE FROM TRUE NORTH 30 = CALM.
DATA IN COLS. 8 AND 12-15 ARE BASED ON 73R

MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS. FASTEST WIND AND SPEEDS ARE FASTEST OBSERVED. THE MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE WITH THE DIRECTION INDICATES PEAK TEST SPEED.

ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

SUMMARY BY HOURS

[illegible]

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

[illegible]

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WE CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA 28801.

noaa

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ENVIRONMENTAL DATA AND INFORMATION SERVICE

Samuel E. Hiteck
DIRECTOR, NATIONAL CLIMATIC CENTER

JSCOMM--MOAA--ASHFVILL.F 23:20:00 15

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

NOTES
CEILING
UNL INDICATES UNLIMITED

WEATHER

1 TORNADO
2 HUNDERSTORM
3 SQUALL
4 RAIN
5 RAIN SHOWERS
6 FREEZING RAIN
7 DRIZZLE
8 FREEZING DRIZZLE
9 SNOW
10 SNOW PELLETS
11 ICE CRYSTALS
12 SNOW SHOWERS
13 SNOW GRAINS
14 ICE PELLETS
15 HAIL
16 FOG
17 ICE FOG
18 GROUND FOG
19 BLOWING DUST
20 BLOWING SAND
21 BLOWING SNOW
22 BLOWING SPRAY
23 SMOKE
24 HAZE
25 DUST

WIND

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TENS OF DEGREES FROM TRUE NORTH: E. E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS. MULTIPLY BY .5 TO CONVERT TO MILES PER HOUR.

STATION
ASTORIA OREGON

AN EQUAL OPPORTUNITY EMPLOYER

YEAR 6 MONTH

30 12

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
COM-210



11:15 AM - 12:45 PM

CLATSOP COUNTY AIRPORT

MONTHLY SUMMARY



FRANCIS HARRIS

ANDERSON, J. 1983. 1983-84.

[illegible]

* EXTREME FOR THE MONTH - LAST OCCURRENCE OF MORE THAN ONE.
* TRACE AMOUNT
* ALSO IN AN EARLIER DATE, JR JATES.
* HEAVY FOG - VISIBILITY 1/4 MILE OR LESS.
* FIGURES FOR WIND DIRECTION ARE TENS OF DEGREES CLOCKWISE FROM TRUE NORTH 70 = CALM.
* DATA IN COLS. 5 AND 12-15 ARE BASED ON 1/2 HR

MORE OBSERVATIONS PER DAY AT 2-HOUR INTERVALS.
 FASTEST WIND MILE PER HOUR SPEEDS ARE FASTEST OBSERVED
 ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS
 OF DEGREES. THE WITH THE DIRECTION INDICATES
 PEAK SUST SPEED.
 ANY ERRORS DETECTED WILL BE CORRECTED AND
 CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN
 THE ANNUAL SUMMARY

SUMMARY BY HOURS

AVERAGES										RESULT
TEMPERATURE										WIND
TEMPERATURE	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND
TEMPERATURE	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND
11	31	30	29	28	27	26	25	24	23	22
12	31	30	29	28	27	26	25	24	23	22
13	31	30	29	28	27	26	25	24	23	22
14	31	30	29	28	27	26	25	24	23	22
15	31	30	29	28	27	26	25	24	23	22
16	31	30	29	28	27	26	25	24	23	22
17	31	30	29	28	27	26	25	24	23	22
18	31	30	29	28	27	26	25	24	23	22
19	31	30	29	28	27	26	25	24	23	22
20	31	30	29	28	27	26	25	24	23	22
21	31	30	29	28	27	26	25	24	23	22
22	31	30	29	28	27	26	25	24	23	22
23	31	30	29	28	27	26	25	24	23	22
24	31	30	29	28	27	26	25	24	23	22
25	31	30	29	28	27	26	25	24	23	22
26	31	30	29	28	27	26	25	24	23	22
27	31	30	29	28	27	26	25	24	23	22
28	31	30	29	28	27	26	25	24	23	22
29	31	30	29	28	27	26	25	24	23	22
30	31	30	29	28	27	26	25	24	23	22
31	31	30	29	28	27	26	25	24	23	22
32	31	30	29	28	27	26	25	24	23	22
33	31	30	29	28	27	26	25	24	23	22
34	31	30	29	28	27	26	25	24	23	22
35	31	30	29	28	27	26	25	24	23	22
36	31	30	29	28	27	26	25	24	23	22
37	31	30	29	28	27	26	25	24	23	22
38	31	30	29	28	27	26	25	24	23	22
39	31	30	29	28	27	26	25	24	23	22
40	31	30	29	28	27	26	25	24	23	22
41	31	30	29	28	27	26	25	24	23	22
42	31	30	29	28	27	26	25	24	23	22
43	31	30	29	28	27	26	25	24	23	22
44	31	30	29	28	27	26	25	24	23	22
45	31	30	29	28	27	26	25	24	23	22
46	31	30	29	28	27	26	25	24	23	22
47	31	30	29	28	27	26	25	24	23	22
48	31	30	29	28	27	26	25	24	23	22
49	31	30	29	28	27	26	25	24	23	22
50	31	30	29	28	27	26	25	24	23	22
51	31	30	29	28	27	26	25	24	23	22

HOURLY PRECIPITATION WATER EQUIVALENT IN INCHES)

[illegible]

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noaa NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

ENVIRONMENTAL DATA AND
INFORMATION SERVICE

James E. Mitchell
DIRECTOR, NATIONAL CLIMATIC CENTER

USCOMM--NOAA--ASHEVILLE

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	TEMPERATURE		WIND		HUMIDITY		WEATHER	SEA	STATE	REMARKS
	AIR	SEA	DIR	SPD	REL	WIND				
01	42	41	40	33	100	0	B	1	1	
02	42	41	40	33	100	0	B	1	1	
03	42	41	40	33	100	0	B	1	1	
04	42	41	40	33	100	0	B	1	1	
05	42	41	40	33	100	0	B	1	1	
06	42	41	40	33	100	0	B	1	1	
07	42	41	40	33	100	0	B	1	1	
08	42	41	40	33	100	0	B	1	1	
09	42	41	40	33	100	0	B	1	1	
10	42	41	40	33	100	0	B	1	1	
11	42	41	40	33	100	0	B	1	1	
12	42	41	40	33	100	0	B	1	1	
13	42	41	40	33	100	0	B	1	1	
14	42	41	40	33	100	0	B	1	1	
15	42	41	40	33	100	0	B	1	1	
16	42	41	40	33	100	0	B	1	1	
17	42	41	40	33	100	0	B	1	1	
18	42	41	40	33	100	0	B	1	1	
19	42	41	40	33	100	0	B	1	1	
20	42	41	40	33	100	0	B	1	1	
21	42	41	40	33	100	0	B	1	1	
22	42	41	40	33	100	0	B	1	1	
23	42	41	40	33	100	0	B	1	1	
24	42	41	40	33	100	0	B	1	1	
25	42	41	40	33	100	0	B	1	1	
26	42	41	40	33	100	0	B	1	1	
27	42	41	40	33	100	0	B	1	1	
28	42	41	40	33	100	0	B	1	1	
29	42	41	40	33	100	0	B	1	1	
30	42	41	40	33	100	0	B	1	1	
31	42	41	40	33	100	0	B	1	1	
32	42	41	40	33	100	0	B	1	1	
33	42	41	40	33	100	0	B	1	1	
34	42	41	40	33	100	0	B	1	1	
35	42	41	40	33	100	0	B	1	1	
36	42	41	40	33	100	0	B	1	1	
37	42	41	40	33	100	0	B	1	1	
38	42	41	40	33	100	0	B	1	1	
39	42	41	40	33	100	0	B	1	1	
40	42	41	40	33	100	0	B	1	1	
41	42	41	40	33	100	0	B	1	1	
42	42	41	40	33	100	0	B	1	1	
43	42	41	40	33	100	0	B	1	1	
44	42	41	40	33	100	0	B	1	1	
45	42	41	40	33	100	0	B	1	1	

STATION										YEAR & MONTH									

11 - NG
JNL MICHAEL J. JAMES

[illegible]

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH. 5 IS FOR EAST, 9 FOR SOUTH, 1 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS MULTIPLY BY .5 TO CONVERT TO MILES PER HOUR.

AN EQUAL OPPORTUNITY EMPLOYER



— 11 —

1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 26

100-443887-1000

[illegible]SUMMARY BY TOPICS

MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVAL
FASTEST WIND AND SPEEDS ARE FASTEST OBSERVED
ONE-MINUTE VALUES WHEN DIRECTIONS ARE 45° OR
135° DEGREES. THE WITH THE DIRECTION NOTICED
PEAK WIND SPEED.

ANY ERRORS DETECTED WILL BE CORRECTED AND
CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN
THE ANNUAL SUMMARY.

-DOUBLE PRECISION- RATED 500,000" IN INCHES[illegible]

IDENTITY (LAST, FIRST, MIDDLE) OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AND IS COMPILED FROM RECORDS IN FILE AT NOAA
NATIONAL CLIMATE CENTER, ASHEVILLE, NORTH CAROLINA 28801

74-1546 103-441 140
1-4032-5311 10-1410-241124

ENVIRONMENTAL DATA AND
ASSESSMENT SERVICE

James E. McInerney
DIRECTOR, NATIONAL CLIMATE CENTER

SCCM--4044--ASHFV: 3

APPENDIX F
DAILY SUMMARY OF WEATHER OBSERVATIONS AT CLATSOP COUNTY AIRPORT,
ASTORIA, OREGON, ON DATES OF BAR TRANSITS

13A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WTSO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE MAY 10 1978

TO CONVERT LIST TO GMT
ADD 2 HRS. SUBTRACT

TIME	SKY AND CEILING	VISIBILITY	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS.	TEMPERATURE	WIND	WIND DIRECTION	WIND SPEED	WIND GUSTS	WIND SQUALLS	WIND RAIN	WIND HAIL	WIND GRAPE	WIND OTHER	REMARKS AND SUPPLEMENTAL CODED DATA
0056	M280VC	10		160.49	42	25	04	000	103	1511					
0157	M280VC	10		160.49	41	28	06	000							
0259	M290VC	10		156.48	42	19	05	779							
0356	M320VC	12		157.48	42	13	07	778	807	1511	48	20001			
72791	81307	67422	15309	85551	66807	65144	20001	457480							
0457	M320VC	15		153.48	42	14	06	778							
0558	M320VC	12	L-	156.48	42	17	07	779	LD45						
0659	M320VC	7	L-			19	07	777	150544						
0756	M320VC	10	L-	156.48	45	19	06	779	LD45						10300 1711
0857	M320VC		R-F			23	07	000							
0958	M320VC	5	R-F	160.49	46	25	05	000	LE8305						
1059	M320VC	5	RW-	156.49	46	18	07	559	KE15835						
1159	M320VC	10				18	07	779	FEW CUFR 6 4ND						
1259	M320VC	15		153.51	46	20	07	779	FEW CUFR 6 4ND						60203 1821 47
72791	82007	74258	15311	68332	08605	65144	70800	20008	45247						
1359	M320VC	15		153.53	45	20	12	779							
1459	M320VC	10	R-	149.53	45	18	07	777	2035						
1559	M320VC	5	R-	149.52	47	18	13	777	40301						1721
1659	M320VC	5	R-	146.61	46	18	08	000							
1759	M320VC	5	R-			18	10	000							
1859	M320VC	5	R-F	143.50	46	19	14	600	255						
1959	M320VC	5	R-F	139.49	46	21	14	600	255						
72791	82114	68616	13959	37422	03710	65144	71500	20026	453470						
2059	M320VC	5	R-F	136.49	45	21	15	600							
2159	M320VC	6	R-F	131.49	45	19	10	600							
2259	M320VC														
2359	M320VC	3/4	R-F			18	12	000							(F61)
0059	M320VC	3/4	R-F	122.48	46	16	10	000	31710						1721
0159	M320VC	4	R-F	119.48	47	16	10	000							
0259	M320VC	5	R-F	114.51	48	13	11	000	2-00002						2 P wind 1056/MS
0359	M320VC	7		109.50	49	09	09	000							
0459	M320VC	10	RW-	109.50	49	09	09	000	2-00002						
72791	72309	44806	10910	75311	07307	65144	73710	20022	453470						
0559	M320VC	10	RW-	129.50	49	21	09	000							
0659	M320VC	10		122.49	45	21	09	000	RF50						

STATION		U.S. DEPARTMENT OF COMMERCE NATIONAL MARINE AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE										STATION	
SURFACE WEATHER OBSERVATIONS												WSO ASTORIA, ORE	
DATE												MAY 29 1978	
TIME												TO CONVERT LIST TO GMT ADD 9 HRS. SUBTRACT	
TIME	SKY AND CEILING HEIGHT IN FEET	VISIBILITY MILES		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS.	TEMP. DEW PT.	WIND				ALTIM. FEET SLP.	REMARKS AND SUPPLEMENTAL CODED DATA	
		STAT.	SEA.				DIR.	SPEED KNOTS	DIR.	SPEED KNOTS			DIR.
R 0155	20 SCT 45 SCT	10				29.5	50.4	33	09		041	302 1800	
R 0155	20 SCT 45 SCT	10				29.5	50.4	34	08		041		
R 0255	20 SCT	10				29.7	49.4	33	09		041		
R 0355	20 SCT	10				29.7	46.4	33	05		041	602 1100 46 20202	
72791	1305	26021		29708		11500	06652	63	293		20002	46146 10	
R 0455	20 SCT	15				30.0	41.3	13	04		042	F BUK DRUR N-E	
R 0555	20 SCT	15				30.2	42.4	12	04		042	F BUK DRUR N-E	
R 0655	20 SCT	15				30.2	49.4	13	04		043	107 1500	
R 0755	20 SCT 25 SCT	15				30.5	52.4	25	04		043		
R 0855	20 SCT 25 SCT	15				30.2	54.4	32	06		042		
R 0955	20 SCT 25 SCT	20				30.3	56.4	36	04		043	1500 1800 40	
72791	2300	20021		30313		65500	07500	43	295		45840 10		
R 1055	20 SCT 25 SCT	20				30.1	57.4	32	11		042		
R 1155	20 SCT 25 SCT	20				30.1	57.4	31	12		042		
R 1255	20 SCT 25 SCT	20				29.7	58.4	32	14		041	807 1801	
R 1355	20 SCT	20				29.9	57.4	31	13		041		
R 1455	20 SCT	20				29.9	57.4	31	13		041		
R 1555	20 SCT	20				29.5	54.4	30	12		040	302 1100 59	
72791	2312	20021		29512		21600	06302	63	226		45840 10		
R 1655	40 SCT	20				29.2	51.4	30	14		037		
R 1755	20 SCT 40 SCT	20				28.9	51.4	31	12		037		
R 1855	20 SCT 25 SCT	20				28.5	53.4	32	16		037	607 1101	
R 1955	20 SCT 25 SCT	15				28.5	51.4	32	16		037		
R 2055	20 SCT 25 SCT	15				28.8	51.4	32	10		037		
S 2155	20 SCT 25 SCT	15						31	04		037	(F161)	
R 2155	20 SCT 25 SCT	15				28.7	51.4	32	06		037	400 1508 59	
72791	2306	74031		22011		65502	06400	63	279		45940 10		
R 2255	20 SCT 25 SCT	12				28.8	50.4	31	05		037		
S 2355	20 SCT	10				29.6	45.4	13	07		037		

STATION

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE JUN 05 1970

TO COLLECT DATA FOR
1600Z

TIME	SKY AND CEILING	VISIBILITY		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESSURE	WIND		TEMPERATURE	RELATIVE HUMIDITY	REMARKS AND SUPPLEMENTAL CODED DATA
		SMALL	SMALL			DIR	SPEED			
R 0050	CLR	10			171.52	43	00	00	001	FEW CL / 205
R 0150	CLR	10			170.51	49	00	00	003	FEW RVR 2-5
S 0200	CLR	10					00	00	003	FEW ST 2000 RVR 2-5
R 0250	CLR	10			170.51	49	00	00	003	FEW ST 2000 RVR 2-5
R 0350	1 SCT	10			165.50	49	14	05	003	FEW RVR 2-5 FEW ST 2000 RVR 2-5
1600 49										
1600 49										
1600 49										
R 0450	CLR	10			163.50	46	00	00	003	FEW ST 2000 RVR 2-5
R 0550	CLR	10			164.52	40	16	04	003	FEW ST 2000 RVR 2-5
R 0650	CLR	15			171.52	35	12	13	004	003 1001
R 0750	CLR	15			170.65	59	00	00	003	
R 0850	250-1000	15			170.69	61	02	04	003	
R 0950	250-1000	15			170.69	67	26	05	003	602 1001 49
1600 49										
1600 49										
1600 49										
R 1050	750-500	15			171.76	62	22	09	003	
R 1150	800-500	15			171.77	59	21	09	003	
R 1250	250-1000	15			171.77	59	25	10	003	400 1001
R 1350	250-1000	15			172.75	59	25	10	004	
R 1450	250-1000	15			170.72	61	24	10	003	
R 1550	250-1000	15			166.71	59	25	07	002	803 1001 79
1600 49										
1600 49										
1600 49										
R 1650	CLR	5			163.70	37	12	06	001	
R 1750	CLR	5			163.63	37	12	07	001	
R 1850	250-1000	15			163.64	50	24	07	001	FEW ST 5/503 1601
R 1950	250-1000	15			160.61	57	22	05	003	FEW ST 5/503 1601
R 2050	250-1000	10			161.52	55	00	00	001	GF FEW ST 2000 RVR 2-5
R 2150	CLR	10			163.57	54	00	00	001	500 1070 79
1600 49										
1600 49										
1600 49										
S 2200	CLR	10					00	00	001	FEW ST 4000 W F FEW ALBOS
1600 49										
1600 49										
R 2350	CLR	8			160.56	54	00	00	003	FEW ST 4000 W F FEW ALBOS
S 2400	1/2 FEW	4					22	07	001	
R 2500	1/2 FEW	4			161.59	57	23	04	001	

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE										WFO ASTORIA, ORE	
SURFACE WEATHER OBSERVATIONS										DATE	TO CONVERT LOT TO GMT ADD 8 HRS. SUBTRACT
TIME	TIME	SKY AND CEILING	VISIBILITY	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS.	TEMP.	WIND	WIND DIRECTION	WIND SPEED	WIND GUSTS	REMARKS AND SUPPLEMENTAL CODED DATA
S 0000		M3 OVC	5	L-			16 05		017		CFI
R 0000		M3 OVC	5	L-	720	57.55	16 07		018	2400	16//
S 0100		250 M3 OVC	3	R-F			16 06		018		
R 0100		1 SCT M5 OVC	3	R-F	722	57.56	19 03		019	LEP 2010	
S 0200		3 SCT M3 OVC	5	R-F			20 06		019		CFI
R 0200		3 SCT M11 OVC	5	R-F	724	57.56	25 04		019		
R 0300		3 SCT M15 OVC	7	R-	726	57.54	27 04		020	10504	16// 57 20 24
/	72791	57204	61619	22614	58211	61105	63217	70160	20001	465570	
R 0400		200 BKN 250 OVC	10		727	57.55	15 04		021	REI FFW STEA 2-40	
R 0500		M10 BKN 250 OVC	10		734	55.55	14 03		022	FEW CURT 3100 15-55	
R 0600		M10 BKN 250 OVC	15		737	60.56	25 04		023	FEW CURT 3100 15-55	
R 0700		M16 BKN 250 OVC	15		741	61.55	28 06		024		
R 0800		M22 BKN 250 OVC	15		741	62.55	24 04		024		
R 0900		M25 BKN 250 OVC	15		746	62.55	27 06		024	3053 1508 57	
/	72791	67709	74022	24617	55509	63237	70004	465570	70060		
R 1000		M16 BKN 250 OVC	15		751	65.55	24 06		027		
S 1100		M16 BKN 250 OVC	15				30 07		027		
R 1100		M16 BKN 250 OVC	15		751	65.55	24 12		027		
R 1200		M16 BKN 250 OVC	15		751	67.55	20 12		027	105 1901	
R 1300		M16 BKN 250 OVC	15		751	66.55	21 08		027		
R 1400		250 - SCT	15		749	68.56	29 08		026	FEW CU	
R 1500		250 - OVC	20		744	67.55	32 09		026	807 1107 68	
/	72791	80021	24414	11507	13807	63235	70004	465570			
R 1600		250 - OVC	20		744	65.53	28 11		025		
R 1700		250 - OVC	20		741	64.53	28 12		024		
R 1800		250 - OVC	20		741	62.53	29 03		024	603 1008	
R 1900		250 - OVC	20		741	67.53	29 07		024		
R 2000		15 SCT 250 SCT	15		742	67.53	33 11		025		
R 2100		15 SCT 250 SCT	15		742	67.54	33 09		025	102 1501 67	
/	72791	53209	24021	24218	75101	12102	63234	70004	465570		
R 2200		12 SCT	10		741	64.53	33 27		024		
R 2300		12 SCT	10		737	64.57	24 03		022		

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE										STATION WSO ASTORIA, ORE	
SURFACE WEATHER OBSERVATIONS										DATE JUN 21 1978	TO CORRECT SET TO SET ADD <u>8</u> MIN. SUBTRACT
TIME	SKY AND CEILING Height in feet	VISIBILITY statute miles		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESSURE inches	TEMPERATURE inches		WIND direction and speed		WIND GUSTS inches	REMARKS AND SUPPLEMENTAL CODED DATA
		direction	distance			air	sea	direction	speed		
R 0056	E 17 OVC	10			190.56	50.32	04	009	803	15//	
R 0157	E 17 OVC	10			188.56	50.21	06	009			
R 0257	E 19 OVC	10			187.57	50.17	05	008			
R 0355	E 18 OVC	10			188.56	50.17	04	009	502	15// 55	
// 72791 212.4 66022 18813 854// 10502 63130 46755 0											
R 0457	E 12 OVC	10			190.56	50.18	04	009			
R 0558	E 14 OVC	10			190.56	50.19	06	009			
R 0658	E 13 OVC	10			190.57	50.26	04	011	307	15//	
R 0758	M 15 OVC	10			200.57	51.27	05	012			
R 0858	M 15 OVC	10			200.59	53.25	05	012	541	BKN OVC	
R 0958	M 15 OVC	12			200.61	53.23	08	012	541	BKN OVC	105 1500
// 72791 72308 69022 20016 75455 12105 63191 46755 0											
R 1058	M 15 OVC	12			200.61	53.24	10	013	541	BKN OVC	
R 1158	M 15 OVC	10			200.62	53.21	09	013	541	BKN OVC	
S 1258	4 OVC	8		L-			05	013	541	BKN OVC	105
R 1358	4 OVC	5		L-			08	013	541	BKN OVC	105
R 1458	4 OVC	10			200.61	54.25	10	014	541	BKN OVC	
R 1558	4 OVC	10			200.62	53.25	08	014	541	BKN OVC	
R 1658	4 OVC	8		RW-	200.59	53.23	08	012	541	BKN OVC	
S 1758	4 OVC	10					07	012	541	BKN OVC	
R 1857	4 OVC	4		RW-F	200.58	54.24	08	012	541	BKN OVC	
R 1957	4 OVC	7			200.57	54.23	07	012	541	BKN OVC	
// 72791 82407 66025 20416 854// 12802 63195 70030 46655 0											
R 2058	M 21 OVC	10			197.56	52.27	07	011	541	BKN OVC	
R 2158	M 21 OVC	5		RW-F	197.54	52.26	05	011	541	BKN OVC	
// 72791 82605 58908 19712 852// 11403 63193 70010 46654 0											
R 2258	M 22 OVC	10			193.54	52.24	03	010	541	BKN OVC	
R 2357	15 OVC	10			192.55	52.30	06	010			

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE										STATION WSO ASTORIA, ORE		
SURFACE WEATHER OBSERVATIONS										DATE JUN 23 1978		
										TO CONVERT LST TO GMT ADD 8 HRS. SUBTRACT		
TIME	TIME	SKY AND CEILING (Height in feet)	VISIBILITY (Miles)		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS.	TEMP BY	DEW PT	WIND SPEED (Knots)	WIND DIRECTION	ALTITUDE FEET	REMARKS AND SUPPLEMENTAL CODED DATA
			Actual	Unobscured								
R	0456	E30LKN 55 OVC	8		NW-	16.1	53.50	12.04	001	RB30	60300	15 //
R	0158	30SCT E50BKN	10			16.1	52.49	08.03	001	RE40		
R	0258	E50LKN	10			16.3	51.49	14.03	001			
R	0358	30SCT E50BKN	10			16.5	50.49	12.04	002	30300	1500 50	20001
/	72791	51204	46.028	16510	55500	07303	63156	70030	20001	46450	0	
R	0458	15SCT E50BKN	10			16.6	50.49	10.04	002			
R	0558	10SCT E50BKN	10			17.1	52.47	09.03	004			
R	0658	15SCT E40BKN	15			17.5	54.51	11.04	005	310	1300	
R	0758	16SCT E50BKN	15			18.0	57.50	12.04	006			
R	0858	19SCT E45BKN	15			18.2	59.49	14.03	007			
R	0958	19SCT E45BKN	15			18.3	62.48	03.03	007	103	1800 50	
/	72791	60203	74022	13317	63400	09103	63174	66450	0			
R	1058	20SCT E45BKN	15			18.7	59.50	23.06	009			
R	1158	19SCT E40BKN	10			18.7	62.51	22.06	009			
R	1258	23SCT E45BKN	15			18.8	65.52	25.05	009	305	1800	
R	1358	20SCT E50BKN	15			19.0	64.50	26.05	009			
R	1458	38SCT E50BKN	15			19.2	65.51	24.12	010			
/	70111											
R	1558	E50 BKN	15			19.3	62.50	26.12	010	205	1300 67	
/	72791	62612	74022	19317	69500	10205	63185	46750	0			
R	1658	E32 BKN	15			19.3	62.49	24.07	010	RMK DSNT SE		
R	1758	M33 OVC	15			19.0	59.49	23.05	009			
R	1858	M38 OVC	15			19.3	58.49	24.04	010	CLIM OVC S-SW	500 1800	
R	1958	M32 OVC	15			19.3	58.50	23.03	010	CLIM OVC		
R	2058	E38 BKN	10			19.3	57.50	13.03	010			
R	2158	E50 BKN	10			19.5	56.50	20.03	011	302	1500 67	
/	72791	72003	66022	19513	75500	10302	63186	46750	0			
R	2258	E50 OVC	10			19.5	55.50	13.04	010	CLIM OVC		
R	2358	70SCT	12			19.2	55.50	15.03	010			

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE		WSO ASTORIA, ORE	
SURFACE WEATHER OBSERVATIONS			
DATE JUN 21 1978		TO CORRECT SET TO GAT ADD 2 Hrs. SUBTRACT	
TIME	SKY AND CLOUDS Clouds in %	VISIBILITY mi ft	WEATHER AND OBSTRUCTIONS TO VISION
SEA LEVEL PRESS.	TEMP AIR	TEMP SURF	WIND DIR SPEED KTS
REMARKS AND SUPPLEMENTAL CODED DATA			
R 0000 705KT	12		1905047 18 04 00 705 1030
R 0100 705KT	12		1904947 13 04 00
R 0200 705KT	12		1904844 11 05 00
R 0300 705KT	15		1904749 10 03 00 FEW Sc / 100 1530 47
72791 21003 74021 19008 15530 07400 63181 46747 (D)			
R 0400 2305KT	20		1904645 12 04 00 FEW Sc AC H230
R 0500 185KT 1000 210	20		1954947 10 03 00
KT			
R 0600 175KT 2500 100	20		1935343 00 00 00 ATCU PWS S / 003 1823
KT 2305KT			
R 0700 175KT 550 1003KT	20		1975951 23 05 01 TCU S
R 0800 225KT 435KT 1000KT	25		2006050 26 05 012
R 0900 275KT 400KT 230KT	25		2046451 25 07 017 210 1901 46
72791 22507 32020 20418 23501 11210 63195 467460			
R 1000 225KT 450 1250KT	25		2076452 24 09 014
R 1100 225KT 450KT 1000KT	25		2106551 24 10 05
R 1200 250KT 450KT 1000KT	25		2146750 25 12 016 210 1920
R 1300 255KT 450KT 1000KT	25		2176250 25 03 017
250KT			
R 1400 205KT 450KT 1000KT	25		2206551 25 11 018
R 1500 225KT 450KT 2300KT	25		2246550 24 10 019 TCU NE / 210 1901 67
72791 22410 22020 22412 28501 10210 63215 467460			
R 1600 225KT 450KT 2300KT	25		2266350 24 11 020
R 1700 195KT 325KT 2500KT	25		2276251 28 10 020
R 1800 195KT 335KT 2500KT	25		2276050 24 09 020 FEW TCU NE-SE / 103 1921
R 1900 195KT 385KT	20		2295850 27 05 021 FEW TCU NE-SE
905KT E2000			
R 2000 E250 BKN	12		2315549 23 04 021
R 2100 E200 BKN	12		2315549 22 03 021 103 1904 67
72791 62023 69021 23113 18406 09103 63222 467460			
R 2200 165KT 4290KT	12		2315550 19 03 021
R 2300 165KT 4500KT	12		2315150 13 04 021
210			

NOV 4 1978

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE NOV 4 1978

TO CONVERT LST TO GST
ADD 8 HRS. (SUBTRACT 8 HRS. FOR WEST OF 180°)

TIME	SKY AND CLOUDS (Amount, Height, Type)	VISIBILITY (Miles)	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS. (Inches)	TEMPERATURE (Fahrenheit)	WIND (Direction, Speed)	ALTITUDE (Feet)	REMARKS AND SUPPLEMENTAL CODED DATA
0000	0-100 000 000	10	RW-	214.46	45	26.15 229	016	27510 1511
0056	M223KN 323KN	12	RW-	217.49	44	22.11	017	220KN V SCT
0100	22 SCT 38 SCT	12				30.12 617	018	
0205	22 SCT 38 SCT	12		227.49	43	26.09	020	RE 10
0303	M223KN	12		241.50	45	29.15	024	22711 1500 42 20102
0400	72791 62915 69032	24110	65500	07227	63222	71120	20102	46048M
0450	M223KN 323KN	12		258.50	40	33.15	039	BINGUL
0500	M223KN 323KN	12		271.47	40	32.03	033	
0600	CLR	12				36.07	034	
0654	CLR	12		275.47	37	36.09	034	234 1500
0735	M343KN	15		283.44	40	24.03	037	
0800	20 SCT 40 SCT 250 SCT	15		300.50	39	32.08	042	
0858	20 SCT 40 SCT 250 SCT	15		302.51	39	30.12	042	127 1301 44
0900	72791 73012 74431	30211	38501	04127	63293	20067	45044	0
0958	20 SCT 250 SCT	20		397.53	40	34.09	041	
1050	20 SCT 250 SCT	20		397.53	38	32.10	041	
1155	20 SCT 250 SCT	20		398.54	40	31.13	041	503 1101
1255	20 SCT 250 SCT	20		398.53	37	30.10	041	
1345	20 SCT 250 SCT	20		398.53	37	32.10	040	
1450	20 SCT 250 SCT	20		398.51	37	31.10	041	500 1136 54
1500	72791 73110 74021	29211	11536	03560	63290	20065	45444	0
1650	20 SCT 250 SCT	15		302.48	38	22.09	042	
1757	20 SCT 250 SCT	15		300.48	39	01.05	042	
1850	20 SCT 250 SCT	15		302.46	37	25.05	042	003 1331
1950	20 SCT 250 SCT	15		299.40	37	12.06	041	
2057	20 SCT 250 SCT	15		302.33	35	12.05	042	
2150	20 SCT 250 SCT	12		302.38	35	12.06	042	500 1101 54
2200	72791 31036 69021	30203	11501	02507	63293	20011	45438	0
2250	20 SCT	12		295.26	34	11.06	042	
2357	20 SCT	12		295.26	34	03.04	042	PTLHY F

WFO-10A
1-5-78

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WSO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE NOV 10 1978

TO 0000Z, 0600Z, 1200Z, 1800Z
1000Z, 1600Z, 2200Z

TIME	SKY AND CLOUDS (FEET, MILES, PERCENT)	VISIBILITY		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESSURE	TEMPERATURE	WIND	HUMIDITY	DEW POINT	REMARKS AND SUPPLEMENTAL CODED DATA
		STATUTE	MILES							
R 0057	CLR	10			261.55	27	13 05	030		603
N 0156	CLR	10			261.29	26	13 05	030		
R 0256	CLR	10			261.33	27	11 03	030		
R 0355	CLR	10			264.55	29	07 06	031		303 29
72791 00706	06000	26.40	00900		52.303	63256	44929			
R 0456	CLR	10			266.32	28	07 07	032		
N 0556	CLR	10			268.36	28	05 10	032		
N 0656	CLR	15			271.35	27	09 05	033		207 1500
R 0756	CLR	15			275.38	27	07 10	034		
R 0856	CLR	25			281.38	27	12 05	036		
R 0956	CLR	25			281.42	27	04 16	026		110 29
72791 00416	82020	29106	00900		53.110	63273	442290			
R 1055	CLR	25			281.43	24	07 14	036		
R 1157	CLR	25			278.45	23	03 14	035		FEW CL NW-NF
R 1256	CLR	25			269.40	23	07 17	032		814 1100
R 1356	CLR	25			264.45	22	05 16	031		FEW CL
R 1457	CLR	25			263.44	20	04 18	022		FEW CL B-605
R 1556	CLR	25			264.48	18	04 19	023		503 45
72791 00419	82020	26400	00900		53.502	63256	445290			
R 1655	CLR	35			268.41	19	05 19	022		0626/06
R 1755	CLR	15			270.40	18	05 19	022		033
R 1855	CLR	15			275.40	18	05 12	016		034 310
R 1955	CLR	15			275.40	19	05 15	034		
R 2055	CLR	15			276.39	19	06 13	035		
R 2155	CLR	15			278.39	19	10 11	035		303 45
72791 01011	74060	27804	00900		53.503	63269	445290			
R 2207	CLR	15			271.33	18	08 08	033		
R 2355	CLR	15			270.33	16	11 06	033		

481-104
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U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WSO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE NOV 28 1973 TO COLLECT LOT TO GWT
ADD 8 PER SUBTRACT

TIME	SKY AND CEILING Height in Feet	VISIBILITY Miles	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS	TEMP F	DEW PT F	WIND DIRECTION SPEED KNOTS	ALT METER SECT TING	REMARKS AND SUPPLEMENTAL CODED DATA
R 0056	M 1 OVC	3	F	207.42	40	00	20	014	3150 16 //
S 0117	M 1 OVC	1	L-F			00	00	015	
S 0142	W 1 X	1/2	F			00	05	015	(FIRI)
R 0156	W 1 X	1/2	F	210	41.10	04	06	015	LRI 240
R 0256	W 1 X	1/2	R-F	210	42.40	12	03	015	R 3.5
S 0341	M 2 OVC	2	F			05	04	016	(FIRI)
R 0356	M 3 OVC	2	F	215	42	00	00	017	FE 25 / 10 300 16 // 40 20091
72791	30105	12215	21506	316	41	05	109	63207	70020 20091 44940 0
S 0441	M 3 OVC	2	F			00	00	015	(FIRI)
R 0456	M 7 OVC	2	F	220	43.41	00	00	015	
S 0541	W 3 X	1/2	F			00	00	014	(FIRI)
R 0556	W 3 X	1/2	F	224	43.42	00	00	019	
S 0631	W 2 X	1/4	F			00	00	019	
R 0656	W 2 X	1/4	F	224	42.41	00	00	019	008
R 0756	W 2 X	1/4	F	224	43.41	00	00	019	
R 0856	W 2 X	1/4	F	231	43.43	10	03	021	USBY N 3/4
S 0926	-X M 3 OVC	1	F			00	00	022	F4 USBY SE-SW 1/2
S 0939	-X M 3 OVC	1	F			05	04	022	F4 USBY SE-SW 1/2 (FIRI)
S 0955	-X M 4 OVC	3/4	F	234	44.43	01	05	022	F6 USBY E-S 1/4 / 310 16 // 40
72791	30105	12104	23407	342	41	06	310	63225	20091 44440 0
S 1015	-X M 7 OVC	1/2	F			00	00	024	F3 USBY SE-S 1/4
R 1055	-X M 7 OVC	1/2	F	241	45.44	00	00	024	F3 USBY SE-SW 1/2
S 1119	-X 45CT M 9 OVC	1/2	F			12	03	025	F2 USBY S-SW 1/4 20091 44440 0
R 1155	-X 45CT M 9 OVC	1/2	F	231	45.44	06	04	021	F2 USBY S-SW 1/4 016 360
S 1231	-X 45CT M 9 OVC	1/2	R-F			00	00	021	F2 USBY S-SW 1/4 N-N 3/4
S 1244	-X 45CT M 9 OVC	1	R-F			00	00	019	F1 USBY SE-SW 1/4 (FIRI)
R 1355	-X 45CT M 9 OVC	1	R-F	217	46.46	18	07	017	F1 USBY E-S 1/4 20091 44440 0
72791	30105	12104	23407	342	41	06	310	63225	20091 44440 0
S 1310	SSCT M 4 OVC	4	R-F			14	06	016	
R 1355	SSCT M 4 OVC	4	R-F	200	46.46	11	05	012	USBY S-SW 1/2
S 1444	SSCT M 4 OVC	2	R-F			01	06	013	USBY N-N 3/4 S-SW 1/2 (FIRI)
R 1455	SSCT M 4 OVC	2	R-F	200	45.44	04	10	012	USBY N-N 3/4
S 1530	SSCT M 3 OVC	5	R-F			09	05	010	
R 1555	M 3 OVC	5	R-F	193	45.44	10	07	010	72421 102 / 49
72791	81007	55616	19307	8062	41	07	724	63185	73140 20091 44440 0
R 1656	E 3 OVC	5	R-F	182	46.44	06	06	007	
S 1730	E 3 OVC	5	R-F			03	07	007	
R 1755	E 3 OVC	2	R-F	185	46.44	05	10	008	
S 1830	E 3 OVC	2	R-F			07	10	005	(FIRI)
R 1857	E 3 OVC	2	R-F	175	46.44	07	11	005	81914 172 //
R 1927	E 3 OVC	2	L-F	171	46.44	07	07	004	REL 310
S 1950	E 3 OVC	2	S-L-F			06	06	003	
R 2057	E 3 OVC	2	L-F	171	46.44	07	06	004	NB 10 E 50
R 2156	E 3 OVC	2	L-F	175	46.44	06	07	005	50005 17 // 49
72791	81007	55616	17508	872	41	07	530	63166	72573 20026 44940 0
R 2256	E 3 OVC	2	R-L-F	180	46.45	07	05	006	NB 00
R 2356	M 1 OVC	1/2	R-L-F	173	46.45	10	04	007	

WISO ASTORIA, ONE

SURFACE WEATHER OBSERVATIONS

DEC 3 1979

TO: [REDACTED]
FROM: [REDACTED]

[illegible]

U.S. DEPARTMENT OF COMMERCE NATIONAL WEATHER SERVICE ASTORIA, OREGON		WSO ASTORIA, ORE	
SURFACE WEATHER OBSERVATIONS		DEC 4 1972	

TIME	STATION	WEATHER AND CLOUDS	WIND DIRECTION AND SPEED	TEMPERATURE AIR	TEMPERATURE SEA	TEMPERATURE SURFACE	TEMPERATURE DEPTH	TEMPERATURE AT 1000	TEMPERATURE AT 2000	TEMPERATURE AT 3000	TEMPERATURE AT 4000	TEMPERATURE AT 5000	TEMPERATURE AT 6000	TEMPERATURE AT 7000	TEMPERATURE AT 8000	TEMPERATURE AT 9000	TEMPERATURE AT 10000	REMARKS AND SUPPLEMENTAL CODED DATA
0054	4520	R-F	210 40	015	009	011												1711
0154	4520	R-F	204 40	012														
0254	4520	R-F	200 00	014														(F101)
0354	4520	R-F	210 40	015														
0454	4520	R-F	192 40	010	017	12												44 10035
0554	4520	R-F	192 40	010	017	12												44 10035
0654	4520	R-F	192 40	010	017	12												44 10035
0754	4520	R-F	192 40	010	017	12												44 10035
0854	4520	R-F	192 40	010	017	12												44 10035
0954	4520	R-F	192 40	010	017	12												44 10035
1054	4520	R-F	192 40	010	017	12												44 10035
1154	4520	R-F	192 40	010	017	12												44 10035
1254	4520	R-F	192 40	010	017	12												44 10035
1354	4520	R-F	192 40	010	017	12												44 10035
1454	4520	R-F	192 40	010	017	12												44 10035
1554	4520	R-F	192 40	010	017	12												44 10035
1654	4520	R-F	192 40	010	017	12												44 10035
1754	4520	R-F	192 40	010	017	12												44 10035
1854	4520	R-F	192 40	010	017	12												44 10035
1954	4520	R-F	192 40	010	017	12												44 10035
2054	4520	R-F	192 40	010	017	12												44 10035
2154	4520	R-F	192 40	010	017	12												44 10035
2254	4520	R-F	192 40	010	017	12												44 10035
2354	4520	R-F	192 40	010	017	12												44 10035

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE		WSO ASTORIA, ORE	
SURFACE WEATHER OBSERVATIONS		DATE DEC 15 1966	TO CORRESPOND TO ADD 3

TIME	WIND AND CEILING	VISIBILITY	WEATHER AND OBSCURATIONS	SEA LEVEL TEMPERATURE	WIND FOR AIRCRAFT	WIND SPEED	REMARKS AND SUPPLEMENTAL CODED DATA
0000	20 KAT E 40 BKN 10			295.40 35.29 09	040	312	1800
0100	20 KAT 45 SCT 10			295.37 33.22 04	041		
0200	20 KAT 45 SCT 10			302.34 31.13 04	042		
0300	20 KAT 45 SCT 10			302.32 30.12 04	042	107	1500 32 20024
0400	72791 21204 6021 32200			285.00 51.07 43293			20024 45132 0
0500	20 KAT 10			305.32 31.13 04	043		
0600	20 KAT 10			305.32 30.12 04	043		
0700	20 KAT E 34 BKN 10			312.39 31.11 04	045	110	1800
0800	20 KAT E 30 BKN 10			315.34 31.11 06	046	200 N-NW	
0900	20 KAT 10			319.34 32.12 07	047		
1000	20 KAT 10			322.35 33.13 07	047	200 N-NW	SWT SW-NW/810 1100
1100	72791 21204 6021 32200			315.00 51.07 43293			20024 45132 0
1200	20 KAT 10			322.41 37.06 05	048		
1300	20 KAT 25 SCT 12			315.43 39.16 05	049		
1400	20 KAT 45 SCT 12			322.44 38.16 05	049	317	1100
1500	20 KAT 25 SCT 12			320.47 37.14 05	049		
1600	20 KAT 25 SCT 10			322.45 36.17 07	050		
1700	20 KAT 25 SCT 10			322.44 36.17 07	050	317	1100 47 4 20024
1800	72791 21204 6021 32200			315.00 51.07 43293			20024 45132 0
1900	20 KAT E 45 BKN 10			323.44 34.17 07	051	200 N-NW	4000 2-5W
2000	20 KAT E 45 BKN 10			321.41 33.17 06	051		
2100	20 KAT E 45 BKN 10			325.41 33.15 07	051	314	1800
2200	20 KAT E 40 BKN 10			324.38 34.09 04	051	200 N-NW	4500 2-5W
2300	20 KAT E 40 BKN 10			323.35 33.15 04	051		
0000	20 KAT E 40 BKN 10			324.32 30.12 05	051	200 N-NW	1513 47
0100	72791 21204 6021 32200			315.00 51.07 43293			20024 45132 0
0200	20 KAT 10			324.32 30.12 05	051		
0300	20 KAT 10			324.32 30.12 05	051		

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE										STATION WSO ASTORIA, ORE	
SURFACE WEATHER OBSERVATIONS										DATE DEC 17 1979	TO CONVERT LOG TO S.I. 1000 9 - 1000 10
TIME	TIME	SKY AND CLOUDS (HOURS)	VISIBILITY (MILES)	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS.	TEMPERATURE (°F)	WIND DIRECTION (°)	WIND SPEED (KNOTS)	WIND GUST (KNOTS)	REMARKS AND SUPPLEMENTAL CODED DATA	
R 0100	0100	E20 BKN 40 OVC	5	R-	29.245	37	17	13	21	PK WND 1700/09 / 13501 1511	
R 0156	0156	E20 BKN 40 OVC	4	RW	29.241	36	17	23	24	PK WND 1900/31	
R 0256	0256	E20 BKN 40 OVC	8	RW-	29.141	38	20	22	24	PK WND 1030/07	
R 0356	0356	E20 BKN 40 OVC	10		29.141	38	20	15	22	PK WND 1931/11 / 31917 1540 24 20	
/ /	12791	62015 61256	00007		63500	03319	69992	71530	20225	444716 00	
R 0456	0456	M12 BKN 40 OVC	10	RW-	29.091	37	21	19	25	PK WND 2027/41 27007	
R 0556	0556	M12 BKN 40 OVC	8	RW-	29.140	36	23	12	25		
R 0656	0656	M12 BKN 40 OVC	7	RW	29.140	36	25	08	24	22420 1211	
R 0756	0756	M12 BKN 40 OVC	5	RW	29.138	34	16	04	24	PK WND 2000/31	
R 0856	0856	M12 BKN 40 OVC	5	RW-F	29.137	35	09	04	24		
R 0956	0956	M12 BKN 40 OVC	5	RW-F	29.138	36	10	03	24	PK WND 2000/31	
---	72791	91003	55908		24803	85411	02204	63039	175340	20091 44536 00	
S 1056	1056	E14 BKN 50 OVC	10		04839	37	09	07	24	FEW STERX 11000 MID-SE 20000	
S 1156	1156	E14 BKN 50 OVC	10				09	08	24	FEW STERX 11000 MID-SE 20000	
R 1256	1256	E14 BKN 50 OVC	10		04641	38	07	06	24	FEW STERX 11000 MID-SE 20000	
R 1356	1356	E14 BKN 50 OVC	15		04842	37	04	06	24	FEW STERX 11000 MID-SE 20000	
S 1456	1456	E14 BKN 50 OVC	15		05140	37	03	06	24	RW WND 2000/31	
S 1556	1556	E14 BKN 50 OVC	5	TW-			37	15	18	2000/31 0534 2000/31	
S 1656	1656	E14 BKN 50 OVC	1	SW-F			29	10	20	2000/31 0534 2000/31	
S 1756	1756	E14 BKN 50 OVC	5	RW-F			33	04	20	2000/31 0534 2000/31	
S 1856	1856	E14 BKN 50 OVC	7	RW-	05835	32	14	03	20	2000/31 0534 2000/31	
S 1956	1956	E14 BKN 50 OVC	7	RW-			13	09	20		
R 2056	2056	E14 BKN 50 OVC	7	RW-	05835	33	13	12	20	2000/31 0534 2000/31	
---	72741	81312	51909		25302	57411	01110	63049	72029	20052 44435 5000 100 100 100 100	
R 2156	2156	E14 BKN 50 OVC	7	RW-	06836	33	20	03	20		
S 2256	2256	E14 BKN 50 OVC	1		07035	33	11	06	20	2000/31 0534 2000/31	
S 2356	2356	E14 BKN 50 OVC	2		07335	33	07	06	20	2000/31 0534 2000/31	
S 2456	2456	E14 BKN 50 OVC	1				16	04	20		
R 2556	2556	E14 BKN 50 OVC	10		07234	32	00	00	20		
R 2656	2656	E14 BKN 50 OVC	10		07232	30	12	04	20		
R 2756	2756	E14 BKN 50 OVC	10		08732	30	00	00	20	2000/31 0534 2000/31	
/ /	72791	62015 61256	00007		63500	03319	69992	71530	20225	444716 00	
S 2856	2856	-X	10	F			20	00	20	2000/31 0534 2000/31	
S 2956	2956	-X	10	F			20	00	20	2000/31 0534 2000/31	
S 3056	3056	-X	10	F			20	00	20	2000/31 0534 2000/31	
S 3156	3156	-X	10	F			20	00	20	2000/31 0534 2000/31	
S 3256	3256	-X	10	F			20	00	20	2000/31 0534 2000/31	
R 3356	3356	-X	10	F			20	00	20	2000/31 0534 2000/31	

101-12A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

AND ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE DEC 20 1973 TO CONVERT LIST TO GMT ADD 8 HRS. SUBTRACT

TIME	SKY AND CLOUDS	VISIBILITY	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESSURE	TEMP	DEN	WIND	WAVE	REMARKS AND SUPPLEMENTAL CODED DATA
0056	45 SCT	10		24825	10	06	08	026	107 1500
0155	M45 BKN	10		25125	10	12	05	027	
0255	M45 BKN	10		25625	9	09	07	029	
0355	40 SCT	10		25823	9	06	06	029	110 1500 22
0456	40 SCT	10		25824	10	06	10	029	
0555	CLR	10		26124	11	06	12	030	
0657	CLR	15		26622	10	07	10	032	308
0757	40 SCT	20		27021	10	07	07	033	
0856	40 SCT	20		27524	10	08	09	035	
0956	CLR	20		28325	10	05	10	037	117 1500 20
1056	CLR	20		29026	11	03	06	039	
1156	CLR	20		29527	11	04	01	039	
1256	CLR	20		29528	11	03	08	037	202 1500
1356	CLR	20		29329	10	05	09	037	
1456	CLR	20		29329	9	04	11	037	
1556	CLR	20		29329	9	05	08	037	602 1500 30
1656	CLR	15		28727	09	06	08	022	
1755	CLR	15		28825	09	09	06	023	
1857	CLR	15		29225	10	07	08	039	208
1955	CLR	15		29322	10	08	06	040	
2055	CLR	15		29922	11	07	08	041	
2156	F100 BCL	15		29922	11	07	07	041	107 1071 20
2255	F100 BKN	15		29921	11	07	04	041	
2357	F100 BKN	15		30223	11	00	20	042	

STATION		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE										STATION	
SURFACE WEATHER OBSERVATIONS												WACO ASTORIA, ORE	
												DATE	
												DEC 01 1978	
												TO CONVERT LIST TO GWT ADD 8 MIL. SUBTRACT	
TIME	TIME	SKY AND CLOUDS	VISIBILITY	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS.	TEMP.	DEW	WIND	WIND	WIND	WIND	WIND	REMARKS AND SUPPLEMENTAL CODED DATA
1	2	3	4	5	6	7	8	9	10	11	12	13	
1	2	3	4	5	6	7	8	9	10	11	12	13	
R	0057	E 55 OVC	10		302	23	10	08	06	042	103	15 //	
R	0156	E 55 OVC	10		303	23	8	08	04	043			
R	0257	E 55 OVC 100 OVC	10		302	24	9	07	06	042			
R	0356	SS SCT 100 SCT	10		300	22	8	08	06	042	802	1570 21	
/	/	72791 4806	16012	30056	257701	63802	03271	42021	0				
R	0456	430T E 55 OVC	10		298	24	10	08	07	041			
R	0556	430T E 55 OVC	10		295	22	10	07	08	040			
R	0656	M 32 OVC 15 OVC	10		298	23	11	07	08	041	502	15 //	
R	0756	E 55 OVC	20		298	24	10	07	07	041			
S	0856	M 25 OVC	20					07	09	041			
R	0956	M 35 OVC	20		300	24	10	07	09	042			
R	0956	E 55 OVC	20		302	24	11	08	10	042	800	1570 21	
/	/	72791 50910	601512	30056	257701	63802	03271	42021	0				
R	1056	E 55 OVC	15		302	25	11	07	11	042	800	1570 21	
R	1156	M 25 OVC	10	S-	298	25	12	07	14	041	800	1570 21	
R	1256	M 25 OVC	7	S-	292	25	15	07	12	039	81000	15 //	
R	1356	M 25 OVC	4	S-	295	25	13	07	13	037			
S	1456	W 25	2	S-				06	11	036			
R	1556	W 25	1	S-	291	24	12	07	11	035			
S	1656	-X M 22 OVC	2	S-				07	12	036	52		
R	1756	-X M 22 OVC	2	S-	291	24	12	07	11	036	59	1570 21	
/	/	72791 50911	62217	29154	257701	63802	03271	42021	0				
R	1856	W 10 X	1	S-	275	23	19	09	09	034			
R	1956	-X M 22 OVC	2	S-	271	23	20	09	09	035	59		
R	2056	-X M 22 OVC	2	S-	270	23	19	09	11	031	161209	1570 21	
R	2156	-X M 22 OVC	2	S-	270	24	19	06	12	035	53		
S	2256	M 25 OVC	7					06	10	035	56	22	
R	2356	M 25 OVC	7		280	24	17	06	15	035	56	22	
R	2456	M 25 OVC	7		281	25	15	06	15	036	11209	1570 21	
/	/	72791 50912	61027	28154	257701	63802	03271	42021	0				
R	2556	SS SCT	7		287	24	18	06	13	033			

WFO-10A 12-71		NATIONAL OCL		U.S. DEPARTMENT OF COMMERCE NATIONAL METEOROLOGICAL ADMINISTRATION NATIONAL WEATHER SERVICE		STATION		DATE		TO CORRESPONDENT ADD. 13	
SURFACE WEATHER OBSERVATIONS										WSO ASTORIA, ORE	
TIME	SAT AND CLOUDS	VISIBILITY		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESSURE	TEMP	WIND	WAVE	ALTITUDE	REMARKS AND SUPPLEMENTAL CODED DATA	
		STATUTE	MILES								
SA 0057	E 35 OVC	10			176.36	33	03 06	000	214	15//	
SA 0154	18 SCT E 33 OVC	10		RW-	175.37	33	00 00	008	204		
SA 0258	12 SCT E 20 OVC	10			170.36	33	00 00	009	183		
SA 0356	12 SCT E 20 OVC	10			170.37	34	13 03	009	11400	13// 34	
/ /	72791 21303 65028	19003	884		01114	63181	70030	44434	0		
SA 0456	12 SCT E 20 OVC	10			173.36	34	00 00	010			
SA 0556	14 SCT E 20 OVC	8			200.37	34	02 04	012			
SA 0657	14 SCT E 20 OVC	8			205.37	34	00 00	014	215	18//	
SA 0754	E 18 OVC	5		F	207.38	35	08 03	014			
SA 0854	M 18 OVC	5		F	210.37	35	05 03	015			
SA 0954	M 18 OVC	5		F	217.39	36	03 05	017	212	15// 33	
/ /	72791 20305 58102	21704	854		02212	63208	43933	0			
SA 1055	M 18 OVC	6		F	220.40	37	06 04	017	212	15// 33	
SA 1155	M 18 OVC	6		F	217.41	37	05 03	017			
SA 1255	M 18 OVC	6		F	217.41	37	06 03	017	000	15//	
SA 1355	12 SCT M 25 OVC	7			215.42	37	07 07	017			
SA 1429	22 SCT M 30 OVC	7					09 05	015			
SA 1455	M 30 OVC	10			214.44	38	09 04	016	810	10VC	
SA 1551	M 30 OVC	10			210.42	37	09 06	015	707	1570 411	
/ /	72791 50306 46012	21006	555		03707	63202	441340				
SA 1653	125.11105 250-10	10			210.39	35	00 00	015			
/ /	OVC										
SA 1757	125.11105 250-10	10			210.37	34	00 00	015			
SA 1856	125.11105 250-10	10			207.37	34	00 00	014	803	1570	
SA 1953	125.11105 250-10	10			207.36	33	11 05	014			
SA 2057	125.11105 250-10	10			214.25	32	00 00	013			
SA 2156	125.11105 250-10	12			197.33	30	00 00	011	810	1530 444	
/ /	72791 20000 49021	19701	15530		51510	63199	444330				
SA 2257	140.5 12	12			190.34	31	09 06	007			
SA 2353	140.5 12	12			183.34	31	07 06	007			

NO. 132A 132A		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE										STATION WSO ASTORIA, ORE		DATE JAN 19 1979		TO CONVERT LIST TO GMT ADD 8 HRS. SUBTRACT	
SURFACE WEATHER OBSERVATIONS																	
TIME	TYPE	SKY AND CEILING HEIGHT IN FEET	VISIBILITY Miles		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS. INCHES	TEMP. AIR °F	DEW PT. °F	WIND			ALTIMETER SETTING INCHES	REMARKS AND SUPPLEMENTAL CODED DATA				
			SURFACE	TO HORIZ.					DIR.	SPEED	CHANG.						
SA 1058		M 11 OVC	3		R-F	223	37	35	06	06		019	80508	102	/		
SP 0121		1 SCT M 9 OVC	3		R-F				05	05		019					
RS 0157		2 SCT M 8 OVC	4		R-F	224	37	35	12	03		019					
SP 0245		2 SCT M 7 OVC	4		L-F				06	03		019				(F1B1)	
SA 0252		2 SCT M 7 OVC	4		R-F	224	37	35	01	03		019	REL 340 LER 052				
RS 0356		2 SCT M 6 OVC	4		R-F	220	37	35	05	04		018	80210	172	/	37 20010	
/ /		72791 80504	56616		22003	2712		02802	65212			71060	20010	44437	0		
RS 0456		2 SCT M 4 OVC	3		R-F	220	37	35	09	05		018					
SP 0518		M 2 BKN 4 OVC	2		R-F				05	07		013					
SA 0558		M 2 BKN 4 OVC	2		R-F	224	38	35	09	03		019					
SP 0644		M 2 BKN 4 OVC	1 1/2		R-F				08	08		019				(F1B1)	
RS 0657		2 SCT M 4 OVC	1 1/2		R-F	227	38	36	07	09		020	30704	172	/		
SA 0757		2 SCT E 4 OVC	1 1/2		R-F	234	37	35	05	04		022					
RS 0855		M 2 OVC	1		L-F	241	38	36	05	03		024	REL 315				
SP 0929		M 2 OVC	1 1/2		L-F	244			09	04		025					
RS 0954		M 2 OVC	2		L-F	248	38	37	07	04		026	22005	17	//	32	
/ /		72791 80704	32516		24303	2711		03220	631239			70570	20015	43332	0		
SP 1024		M 2 OVC	3		F				03	03		027	THN SPTS 10VC				
SA 1056		M 2 OVC	3		F	251	40	32	01	03		027	LSIS THN SPTS 10VC				
SP 1128		M 2 OVC	2		L-F				14	03		026				(F1B1)	
SP 1135		M 2 OVC	1 1/2		L-F				07	03		026					
SP 1144		M 2 OVC	1		L-F				04	05		026				(F1B1)	
SA 1155		M 2 OVC	1		L-F	251	40	39	36	04		027	L375				
SP 1217		E 2 OVC	3/4		L-F				03	05		026					
SA 1226		E 2 OVC	3/4		L-F	242	41	39	07	04		026	00000	16	//		
SA 1357		E 2 OVC	3/4		L-F	244	41	40	07	04		025					
SA 1455		25057 01/2	3/4		L-F	244	42	40	04	03		025					
SA 1551		E 3 OVC	3/8		L-F	244	41	40	07	05		025	60300	16	//	42	
/ /		72791 20705	12515		24405	0421		04603	63235			70050	20015	44237	0		
SA 1646		E 3 OVC	3/8		L-F	242	41	40	09	03		025					
SP 1731		E 3 BKN 7 OVC	1		R-F				07	03		024					
SA 1756		E 3 BKN 7 OVC	1		R-F	241	41	40	12	03		024	LS 160316				
SP 1800		E 3 BKN 7 OVC	2		R-F				10	03		024				(F1B1)	
SA 1856		E 2 BKN 7 OVC	2		R-F	241	41	39	07	05		024	60314	162	/		
SP 1956		E 2 BKN 6 OVC	2		RE	241	41	40	00	00		024					
SA 2056		E 2 BKN 6 OVC	2		RE	241	41	40	05	03		024					
SA 2156		M 2 OVC	2		R-F	237	42	40	05	07		025	60351	16	//	42	
/ /		72791 80507	32416		23705	2711		04803	63239			75170	20016	44237	0		
SP 2232		M 2 OVC	1		R-F				03	03		023					
RS 2252		M 2 OVC	2		L-F	239	41	43	13	03		022	LS 160316				
SA 2320		M 4 OVC	3		L-F				20	14	620	024	WSHFT 01 FR 22				
SA 2356		M 4 OVC	3		L-F	239	41	43	20	12	619	024	WSHFT 01 FR 23				

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U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

STATION
WSO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE
JAN 21 1973
TO CONVERT LIST TO GMT
ADD 8 HRS. DEDUCT

TIME	TIME	SKY AND CLOUDS	VISIBILITY	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS	TEMP	WIND	ALTITUDE	REMARKS AND SUPPLEMENTAL CODED DATA
TYPE	TIME	SKY AND CLOUDS	HEIGHT	TO VISION	IN INCHES	IN DEGREES	DIRECTION	FEET	
R	0000	BSC M7000	3	L-F	190.40	12	0012	00	REFLECT / 01200 1711
SA	0100	BSC 3500 F7000	3	R-F	197.45	41	30103	00	3500 V BUN 4500 WINDY 1800
SP	0200	MIG BUN 3000	2	R-F			29107	00	WINDY 1800
SP	0300	BSC 1500 F7000	3	R-F			30112	00	R- ONLY R
SA	0400	BSC 1500 F7000	3	R-F	193.42	40	30110	00	R- ONLY R
SA	0500	BSC 1500 F7000	3	R-F	197.41	39	3107	01	R- ONLY R / 30717 1511 41
72791	03107	45016	19705	85211	01307	13123	71770	20026	45341(1)
SP	0600	BSC 1500 F7000	5	R-F			10104	01	(F)
SA	0700	BSC 1500 F7000	6	R-F	200.41	40	1305	01	
SA	0800	BSC 1500 F7000	10		197.42	39	1303	01	130515
SA	0900	BSC 1500 F7000	12		204.40	39	1401	01	130711 1511
SA	1000	BSC 1500 F7000	10		204.39	39	0000	01	130711 1511
SA	1100	BSC 1500 F7000	15		210.40	39	0000	01	130711 1511
SA	1200	BSC 1500 F7000	15		214.44	39	3104	01	130711 1511
72791	13104	74016	21407	35000	01310	12205	71150	20036	45341(1)
SA	1300	BSC 1500 F7000	15		217.42	39	3016	01	
SA	1400	BSC 1500 F7000	15		217.44	39	3009	01	
SA	1500	BSC 1500 F7000	15		217.45	39	3112	01	103 1500
SA	1600	BSC 1500 F7000	15		217.45	39	3113	01	
SA	1700	BSC 1500 F7000	15		219.45	39	3108	01	
SA	1800	BSC 1500 F7000	15		220.40	39	3100	01	303 1201 46
72791	19009	74020	22006	23001	02203	67212	20032	446330	
SA	1900	BSC 1500 F7000	15		220.41	39	3208	01	
SA	2000	BSC 1500 F7000	15		219.36	39	3200	01	
SA	2100	BSC 1500 F7000	15		224.37	32	0304	01	303 1001
SA	2200	BSC 1500 F7000	15		226.33	30	1004	02	
SA	2300	BSC 1500 F7000	10		227.33	31	0000	02	
SA	2400	BSC 1500 F7000	10		232.31	31	1003	02	303 41
72791	01003	06020	23231	00700	02008	63224	20023	446330	
SA	0100	BSC 1500 F7000	7		234.30	30	0505	02	
SA	0200	BSC 1500 F7000	7		231.31	31	0000	02	

[illegible]

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE				STATION WSO ASTORIA, ORE						
SURFACE WEATHER OBSERVATIONS				DATE JAN 28 1975						
TIME		SKY AND CLOUDS REMARKS	VISIBILITY MILES	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESSURE	TEMPERATURE DEGREES FAHRENHEIT	WIND DIRECTION SPEED KNOTS	WIND GUSTS KNOTS	WIND SHEAR KNOTS	REMARKS AND SUPPLEMENTAL CODED DATA
SA 0056	-X		1/4	F	254	27.24	00.00	020	F9	/ 108
SA 0155	-X		1/4	F	253	27.24	00.00	020	F7	
SP 0220	-X		2	F			00.00	020	F4	
SP 0225	-X		1/2	F			01.00	020	F9	
PS 0257	-X		2 1/2	F	258	25.22	00.00	020	F3	
PS 0356	-X		5	F	261	25.23	00.00	020	F1	/ 307 24 20031
72791 00000 58104 26154 00900 55307 02252 20031 472240										
SA 0453	-X		5	F	261	24.21	00.00	020	F1	
SA 0553	-X		7	F	261	25.22	00.00	020	F1	
SP 0650	CLR		15		263	25.23	00.00	020	PTCHY	/ 302
SP 0725	-X		3/4	F			00.00	020	F4	
SP 0745	WOX		1/8	F			00.00	020	(F1P1)	
SA 0757	WOX		1/8	F	268	24.20	00.00	020		
SP 0815	-X EV CL		1/2	F			00.00	020	F4	
SP 0831	-X 4 CL		1/2	F			00.00	020	F2	/ 304 HIR 5
PS 0850	CLR		1	F	268	27.25	00.00	020	HIR 5	
SP 0900	CLR		3	F			00.00	020	HIR 5	
SA 0950	CLR		3	F	271	24.24	00.00	020	HIR 5	/ 208 23
72791 00000 43104 27151 00900 55275 02252 20035 431230										
SP 1050	CLR		10		268	32.30	00.00	020	FWW	/ 100 11
SA 1150	CLR		15		241	37.31	07.05	020	FWW	/ 100 11
SP 1200	CLR		15		241	39.30	04.05	020	FWW	/ 100 11
SA 1240	CLR		15		241	39.31	01.06	020	FWW	/ 100 11
SP 1300	CLR		15		241	40.30	03.07	020	FWW	/ 100 11
SA 1550	CLR		15		237	38.30	04.07	020	FWW	/ 100 11
72791 10407 74020 22703 11500 51412 02252 20035 431230										
SA 1650	850 -8T		15		224	26.57	07.05	020	FWW	/ 100 11
SA 1750	850 -8T		15		221	24.53	07.05	020	FWW	/ 100 11
SA 1850	850 -8T		12		221	20.27	07.05	020	FWW	/ 100 11
SA 1950	850 -8T		10		227	21.27	09.05	020	FWW	/ 100 11
SA 2050	850 -8T		10		227	22.27	09.05	020	FWW	/ 100 11
SA 2150	850 -8T		10		224	27.27	07.05	020	FWW	/ 100 11
72791 20705 14021 22453 00900 51407 02252 20035 431230										
SA 2250	CLR		10		220	28.25	07.05	020	FWW	/ 100 11
SA 2350	CLR		10		217	28.25	06.05	020	FWW	/ 100 11

WFO ASTORIA, ORE

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

FEB 07 1979

TO CONT. REPORT TO THE
NATIONAL WEATHER SERVICE

SURFACE WEATHER OBSERVATIONS

TIME	SEA AND CEILING	VISIBILITY	WEATHER AND OBSTRUCTIONS TO VISION	SEA STATE	TEMPERATURE	WIND	WAVE	REMARKS AND SUPPLEMENTAL CODED DATA
19 0056	456T 1056T ELS 0V	6	R-		153.45 172	25 09	773 2570	172 /
SA 0156	456T 1056T ELS 0V	7	R-		160 44 411	25 07	720	
SA 0256	1456T ELS 0V	10			166 43 39	24 06	002 1711T R-	
SA 0356	1456T ELS 0V	10				23 06	003 1711T R-	
SA 0456	25 56T ELS 0V	10			175 42 39	27 10	004 1711T / 220B 1500 41 20 129	
/ / 72791 72710 66216 17206 785 / 04220 63164 71350 20169 44941								
SA 0556	25 56T ELS 0V	10			176 40 37	26 05	005	
SA 0656	25 56T ELS 0V	10			180 40 37	22 03	006	
SA 0756	25 56T ELS 0V	15			190 37 36	00 00	007 217 1500	
SA 0856	25 56T ELS 0V	10	RW-			14 03	010	
SA 0956	25 56T ELS 0V	10	RW-		234 38 36	00 00	013 1324 1100V	
SA 1056	25 56T ELS 0V	12				14 05	013	
SA 1156	25 56T ELS 0V	12			214 39 37	16 07	016 1575	
SA 1256	25 56T ELS 0V	12			220 41 39	12 07	017 25003 1578 34	
/ / 72791 21207 69022 22005 25677 04220 63212 70320 20124 44934								
SA 1356	25 56T ELS 0V	12			227 45 40	13 03	020	
SA 1456	25 56T ELS 0V	12			231 47 39	22 07	020	
SA 1556	25 56T ELS 0V	12			234 47 39	22 07	019 003 1908	
SA 1656	25 56T ELS 0V	12			224 47 39	22 09	019	
/ 25001								
SA 1756	25 56T ELS 0V	12			227 47 39	22 07	020	
SA 1856	25 56T ELS 0V	12			46 37	22 07	020	
SA 1956	25 56T ELS 0V	12			231 46 39	22 07	021 307 1571 47	
/ / 72791 22207 69022 23108 35471 04307 63222 20093 44834								
SA 2056	25 56T ELS 0V	12			232 45 38	19 06	022	
SA 2156	25 56T ELS 0V	12			229 45 39	12 04	021	
SA 2256	25 56T ELS 0V	12			227 44 38	14 04	020 302 1511	
SA 2356	25 56T ELS 0V	7	R-		230 44 38	13 03	020 18015	
SA 2456	25 56T ELS 0V	7	R-		232 42 38	00 00	019	
SA 2556	25 56T ELS 0V	8			215 42 39	07 05	017 18115 31201 1511 47	
/ / 72791 22207 69022 23108 35471 04307 63222 20093 44834								
SA 2656	25 56T ELS 0V	8			209 42 39	10 04	015	
SA 2756	25 56T ELS 0V	8	R-F		204 42 39	08 05	013 18303	

WFO 104
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U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

STATION

WSO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE

FEB 11 1979

TO CONVERT LIST TO SUR
FAC. 5 MIN. SUBTRACT

TIME	SEA AND CEILING	VISIBILITY	WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESSURE	WIND	WIND DIRECTION	WIND SPEED	WIND GUSTS	WIND VELOCITY	WIND DIRECTION	WIND SPEED	WIND GUSTS	WIND VELOCITY	REMARKS AND SUPPLEMENTAL CODED DATA
0000	M1000	3	L-F	102.45	21	07	00	21002	16//					
0100	M1000	5	L-F	102.45	21	07	00							
0200	M1000	6	F	102.45	21	00	00							INTMT L-
0300	M1000	3	L-F	102.45	21	03	00	10203	16// 45	00083				72791 22103 42515 16007 860// 07103 63151 70270 80083 449450
0400	M1000	4	L-F	102.47	21	07	00							
0500	M1000	5	L-F	102.47	21	02	00							
0600	M1000	6	L-F	102.43	21	02	00	40001	16//					
0700	M1000	5	L-F	102.43	21	07	00							
0800	M1000	2	R-F		14	06	00							
0900	M1000	2	R-F		15	05	00							(F101)
1000	M1000	10		102.48	21	04	00	10010	16010	20055	448420			
1100	M1000	5	R-F		18	13	00							(F101)
1200	M1000	5	R-F	102.48	21	12	00	10012	16012	20055	448420			
1300	M1000	10			20	11	00							
1400	M1000	12		102.50	21	12	00	10012	16012	20055	448420			
1500	M1000	15		102.50	21	14	00	10014	16014	20055	448420			
1600	M1000	15		102.50	21	13	00	10013	16013	20055	448420			
1700	M1000	12			19	15	00	10015	16015	20055	448420			
1800	M1000	4	L-F		20	14	00	10014	16014	20055	448420			
1900	M1000	5	L	102.50	21	14	00	10014	16014	20055	448420			
2000	M1000	12	R	102.50	21	13	00	10013	16013	20055	448420			
2100	M1000	15			20	12	00	10012	16012	20055	448420			
2200	M1000	12	R	102.50	21	11	00	10011	16011	20055	448420			
2300	M1000	10	R	102.50	21	10	00	10010	16010	20055	448420			
0000	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
0100	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
0200	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
0300	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
0400	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
0500	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
0600	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
0700	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
0800	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
0900	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1000	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1100	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1200	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1300	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1400	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1500	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1600	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1700	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1800	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
1900	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
2000	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
2100	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
2200	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			
2300	M1000	5	R-E	102.49	21	12	00	10012	16012	20055	448420			

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U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE

FEB 22 1979

TO CONVERT CST TO GMT
ADD 8 HRS. SUBTRACT

TIME	SKY AND CEILING Height in Feet	VISIBILITY		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESS.	TEMP.	DEW PT.	WIND				ALTIM. ETER. SETTING	REMARKS AND SUPPLEMENTAL CODED DATA
		UNFAVORABLE	FAVORABLE					REF.	APPROX.	MAX.	MIN.		
A 0056	E35 OVC	10			0513837	09	07	968	605	1500			
A 0156	E35 OVC	10			0484038	08	05	967					
A 0256	E35 OVC	10			0483938	08	06	967					
P 0339	R25 OVC	10				08	05	967					(F1A1)
A 0356	15 SCT E25 OVC	10		RW-	0484038	08	06	967	3300	6300	1500	37	
/	/	72791	60506	66502	04804	354	//	07603	63039	72010	44037	0	
A 0456	ER BKN 75 OVC	10		RW-	0483938	08	05	967					
A 0556	14 SCT E25 OVC	10			0483938	07	07	968	1515				
A 0656	15 SCT E25 OVC	15			0483736	09	06	968	60300	1500			
P 0700	15 SCT 200 - BKN	15				07	08	968					(F12)
A 0756	14 SCT 700 - BKN	15			0413837	07	08	968					
A 0856	35 SCT 200 SCT	5			0414139	07	11	968					
A 0956	55 BKN 900 BKN	15			0414439	07	09	968	60300	1879	57		
/	/	200 BKN											
/	/	72791	60708	74028	04107	58478	04608	63032	70050	44437	0		
A 1056	FUS BKN 200 BKN	12			0234532	12	07	969	RWU DONT E AND S				
P 1132	M 25 BKN -5 OVC	12				06	05	963	RWU DONT SW				
A 1155	10 SCT M20 BKN -5 OVC	15			0344559	10	03	963					
A 1256	15 SCT M20 BKN -5 OVC	15			0274841	09	11	961	714	1511			
A 1355	15 SCT M20 BKN -5 OVC	15			0244739	09	12	961	1300	N SCT			
P 1430	15 SCT 200 - BKN	15				14	11	962	RWU DONT S-W				
A 1455	50 SCT M45 OVC	15			0214738	10	10	957	RWU DONT SW-W				
A 1555	M30 BKN -5 OVC	15			0214532	11	09	967	607	1511	47		
/	/	72791	21109	74022	02107	25471	03607	63012	44037	0			
A 1657	15 SCT M41 OVC	15			0244438	14	03	960	R091623				
A 1756	18 SCT M20 OVC	10			0224133	06	06	960	113059	610	420		
A 1857	18 SCT M32 OVC	10			0244240	18	05	960	105	6001	30501	1511	
A 1955	18 SCT M30 OVC	7		R-	0244140	15	03	960	1020	610	370		
A 2055	18 SCT M35 OVC	7		R-	0264137	06	07	961	610	620			
A 2156	18 SCT M30 BKN	10			0294139	09	06	962	613	60501	1500	48	
/	/	72791	60708	60016	02905	65400	03305	63020	70110	20001	44037	0	
A 2256	18 SCT M30 OVC	10			0314038	09	05	962	616	6000			
A 2356	18 SCT M20 BKN	10			0313937	08	08	962	616	600			

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U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE MAR 14 1973
TO CONVERT LIST TO DAT
ADD 2000 HRS. SUBTRACT

TIME	SKY AND CEILING	VISIBILITY		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESSURE	WIND		TEMPERATURE	WET BULB TEMPERATURE	DEW POINT	RELATIVE HUMIDITY		REMARKS AND SUPPLEMENTAL CODED DATA
		SM	KT			DIR	SPD				%	WIND	
2005L	11 SCT M14 OVC	10			195.49	46	32	05	011	105	15	//	
2015L	11 SCT M14 OVC	10			195.47	46	07	05	012				
2035L	11 SCT M15 OVC	10			193.46	45	00	00	010				
2055L	11 SCT M15 OVC	10			192.77	45	13	04	010	003	15	//	Y6
2105L	11 SCT M19 OVC	10			193.45	44	09	04	009				
2055L	13 SCT M15 OVC	15			197.44	43	17	04	005				
2055L	M15 AKN 1000 FT 1500 OVC	15			197.43	42	12	04	005	105	15	72	
2073L	M15 AKN 1000 FT 1500 OVC	10			00	04			005	1000	15	72	
2075L	M15 AKN 1000 FT 1500 OVC	10			197.46	44	07	03	009	1000	15	72	
2100L	M13 AKN 250 OVC	10			187.49	46	04	07	003				(F131)
2030L	M13 AKN 250 OVC	12			187.49	46	04	07	003				
2053L	M13 AKN 250 OVC	15			187.53	45	21	12	007	400	1503	43	
2100L	22791 82112 74022 18712 75409 07400 63179 453430												
2105L	M23 AKN 250 OVC	15			187.53	45	22	15	009				
2115L	M23 AKN 250 OVC	15			183	55	45	23	12	007	230	KN V	SCT
2120L	2250 75 5000 3000 15						16	12	007	2400	50	SW	
2125L	2250 75 5000 3000 15				193	55	44	19	15	007	603	15	79
2134L	M26 AKN 7500 2500 15						21	14	005				
2135L	M26 AKN 7500 2500 15				176	55	45	22	12	007	2000		
2145L	M26 AKN 7500 2500 15				173	56	45	21	13	007	2000	2000	15
2155L	M26 AKN 7500 2500 15				173	55	45	19	14	007	2000	2000	15
2200L	22791 82114 74022 17313 75508 07410 63168 453430												
2205L	M26 AKN 7500 2500 15				170	50	47	13	16	005	2000		
2215L	E250 15 15				170	53	47	17	14	005	2000		
2240L	E250 15 15				170	51	49	13	12	005	2000	2000	15
2245L	E250 15 15				168	51	49	13	17	003			
2255L	M22 AKN 4000 15				168	53	49	14	05	003			
2305L	7500 2500 15				170	50	49	13	06	003	5000	170	56
2315L	22791 81305 54616 17010 27321 09129 63161 75000 20002 456430												
2325L	7500 2500 15				173	48	47	22	08	003			
2335L	7500 2500 15				165	48	47	22	06	002			

WFO 14
1919

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

STATION
WSO ASTORIA, ORE.

SURFACE WEATHER OBSERVATIONS

DATE
MAR 22 1919

TIME
0000

TIME	SKY AND CLOUDS	VISIBILITY	WEATHER AND OBSTRUCTIONS TO VISION	SEA	WIND	WAVE	CURRENT	REMARKS AND SUPPLEMENTAL CODED DATA
0055	CLR	10			150 37 37 07 05			211
0155	CLR	7			166 37 37 13 05			003 F Fm 2
0255	CLR	7			170 37 37 13 05			003 F Fm 2
0355	CLR	7			170 37 37 13 07			003 112 36
72791	01207	61020	17003	00900	03110	63111	45736	(1)
0455	CLR	8			176 37 37 12 07			005
0555	CLR	8			183 37 37 12 05			007
0655	CLR	9			190 37 37 09 05			009 322
0755	CLR	10			193 37 37 09 07			010
0855	CLR	15			200 37 37 12 03			012
0955	CLR	15			204 37 37 12 04			013 214 34
72791	03204	74020	20414	00900	07214	63125	457340	
1055	CLR	15			210 37 37 12 07			015
1155	CLR	15			214 37 37 12 09			016
1255	CLR	15			215 37 37 12 10			017 212 1100
1355	CLR	15			214 37 37 12 09			016
1455	CLR	15			215 37 37 12 11			017 ST S-W SC N-E
1555	CLR	15			220 37 37 12 11			017 ST S-W SC N-E-3/805 1400
72791	12411	74020	22012	14420	09207	63012	460340	
1655	CLR	12			225 37 37 12 10			001022A SW-W-120 1 TMO S-E
1755	CLR	12			224 37 37 12 07			001022A S 1 TMO
1855	CLR	10			217 12 47 15 03			001022A S-W-120 1 TMO / 557
1955	CLR	10			224 11 43 11 03			001
2055	CLR	8			237 13 43 15 04			001
2155	-X	5	F		24 11 41 11 04			001 F1 / 114 160
72791	01024	52 00	24105	25400	05114	63012	460340	
2255	-X	3	F		242 13 43 12 04			001 F2
2355	-X	3	F		00100			001 F3
2455	-X	1	F		00100			001 F3 0330 S 14 0 110
2555	-X	1	F		00100			001 F3 0330 S 14
2655	-X	1	F		13 05			001 F3 (100)
2755	-X	1	F		214 37 37 14 03			001 F3

WSD ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

MAR 23 1973

TO THE EAST OF THE

TIME	DATE	SKY AND CEILING	VISIBILITY		WEATHER AND OBSTRUCTIONS TO VISION	SEA LEVEL PRESSURE	TEMPERATURE	WIND DIRECTION SPEED	WIND GUST SPEED	ALTITUDE FEET	REMARKS AND SUPPLEMENTAL CODED DATA
			MILES	STATUTES							
SP 0024	W 2X	3/7	F				13 04	024			
SA 0055	W 2X	3/7	F		219.41	11	13 04	026	107		
SA 0156	W 2X	3/7	F		213.37	39	07 08	026			
SA 0254	W 1X	1/4	F		219.40	43	07 04	027			
SA 0356	W 1X	1/4	F		210.37	39	11 04	026	000	37	
/ / 72791	91104	0445	24304	7711	011000	6323	13 037(1)				
SA 0455	W 1X	3/7	F		251.37	37	12 05	027			
SA 0556	W 1X	3/7	F		252.35	35	12 01	028			
SP 0606	-X	3/7	F				13 05	029	127		
SP 0617	-X	1/2	F				00 00	029	F 6		
SP 0642	-X	1	F				13 05	027	25		(CIR)
SP 0646	CLR	1 1/2	F				13 05	021			(CIR)
SA 0655	CLR	1 1/2	F		252.34	34	13 05	029	310		
SA 0711	CLR	7					13 03	027	F 11X NE-E		
SA 0755	CLR	7			261.41	41	12 05	029	F 6X NE-E		
SA 0857	CLR	15			261.47	43	02 04	029			
SA 0956	CLR	15			263.51	44	30 03	021	205	33	
/ / 72791	03003	744024	26311	00700	07205	63294	45133	0			
SA 1057	CLR	15			261.55	45	33 05	030			
SA 1156	CLR	15			259.53	45	31 08	030			
SA 1257	CLR	15			254.59	44	33 09	029	708		
SA 1357	CLR	20			244.66	44	32 11	025			
SA 1457	CLR	20			241.64	44	31 12	024			
SA 1551	CLR	20			241.63	41	20 15	024	614	67	
/ / 72791	02915	00020	24117	00900	05614	63232	46733	0			
SA 1655	CLR	30			241.65	41	27 10	024			
SA 1756	CLR	30			241.67	41	26 07	024			
SA 1855	SO -SCT	35			241.50	41	23 07	024	150	SCT / 400	
SA 1955	CLR	15			241.47	41	15 10	023			
SA 2055	CLR	15			241.43	41	00 00	024			
SA 2155	CLR	15			241.41	39	14 05	025	003	167	
/ / 72791	01005	67520	24405	02000	01003	62923	46733	0			
SA 2255	CLR	10			241.42	39	19 03	026			
SA 2355	CLR	10			241.39	39	00 00	025			

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

40733

CEILING
ONLY INDICATES AIRPOT

4241-63

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1  TORNADO
2  HUMORS:FORM
3  SQUALL
4  RAIN
5  RAIN SHOWERS
6  FREEZING RAIN
7  DRIZZLE
8  FREEZING DRIZZLE
9  SNOW
10 SNOW PELLETS
11 ICE CRYSTALS
12 SNOW SHOWERS
13 SNOW GRAINS
14 ICE PELLETS
15 HAIL
16 FOG
17 ICE FOG
18 FROST:FOG
19 BLOWING DUST
20 BLOWING SAND
21 BLOWING SNOW
22 BLOWING SPRAY
23 SMOKE
24 HAZE
25 FOG

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440

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TENS OF DEGREES FROM TRUE NORTH: 01, 09 FOR EAST, 3 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS.
MULTIPLY BY 1.85 TO CONVERT
TO MILES PER HOUR.

5424

1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 26

• 512 • JGIM

IN JULY 1960 THE U.S. AIR FORCE

POSTAGE AND FEES PAID

DEPARTMENT OF COMMERCE



1998

[illegible]

APPENDIX G
WIND, SEA AND SWELL OBSERVATIONS FROM
LIGHTSHIP *COLUMBIA* AT APPROXIMATE TIMES OF BAR TRANSITS
(PHASE I ONLY)

SOURCE: S. Noble, U.S. Army Engineer District,
Portland, Personal Communication

SUMMARY OF WAVE SPECTRA AND WIND DATA AND PLOTS OF
WAVE SPECTRA CORRESPONDING TO APPROXIMATE TIMES
OF BAR TRANSITS
(PHASE II AND SELECTED VOYAGES OF PHASE I)

SOURCE: Dr. Lee Harris, U.S. Army Coastal Engineering
and Research Center

Note: All wave spectra data is to be considered preliminary. Wave spectra data for Voyage Nos. 20, 21, 22, 30, and 31 are from a Waverider buoy which was implanted by the Portland District Army Corps of Engineers near the lightship *Columbia*. Wave spectra data for the remaining voyages are from the NOAA wave gauge located in the navigational lightbuoy which replaced the lightship *Columbia*.

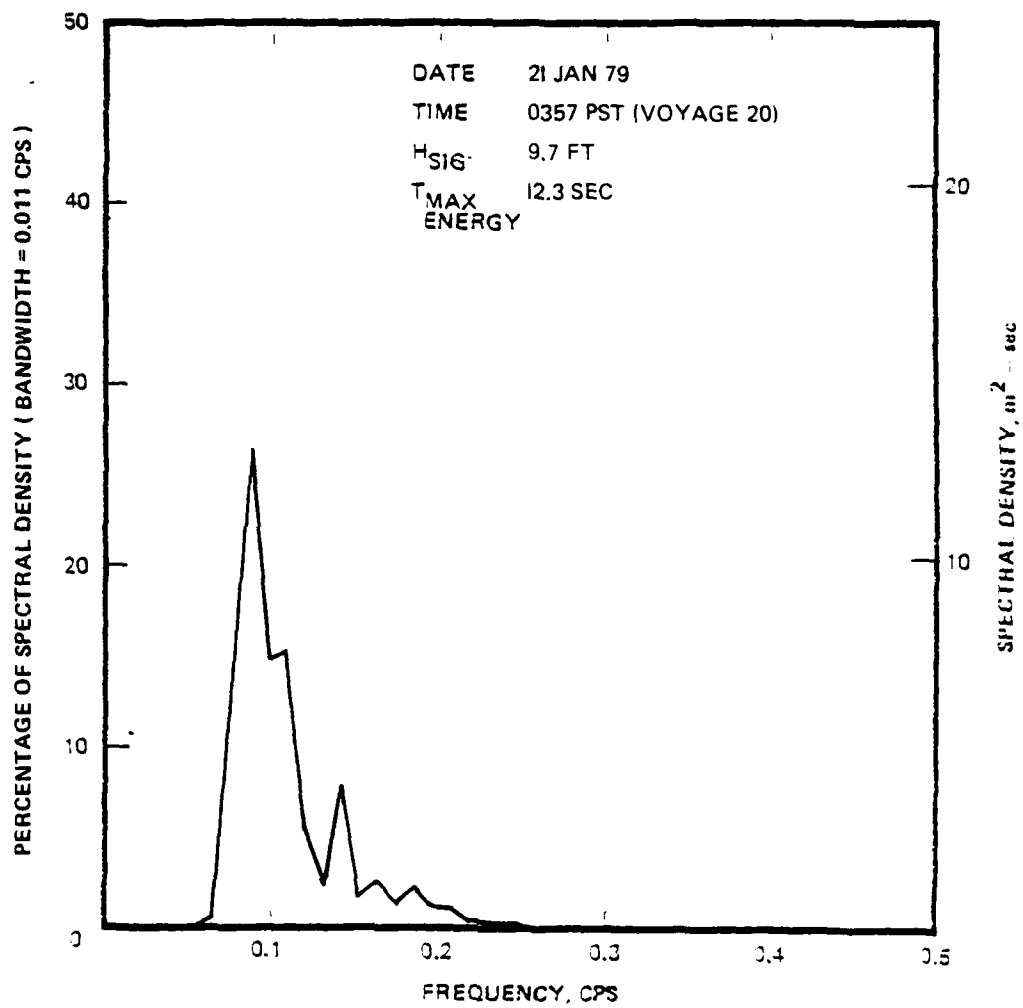
WIND, SEA AND SWELL OBSERVATIONS
FROM LIGHTSHIP COLUMBIA
AT APPROXIMATE TIMES OF BAR TRANSITS

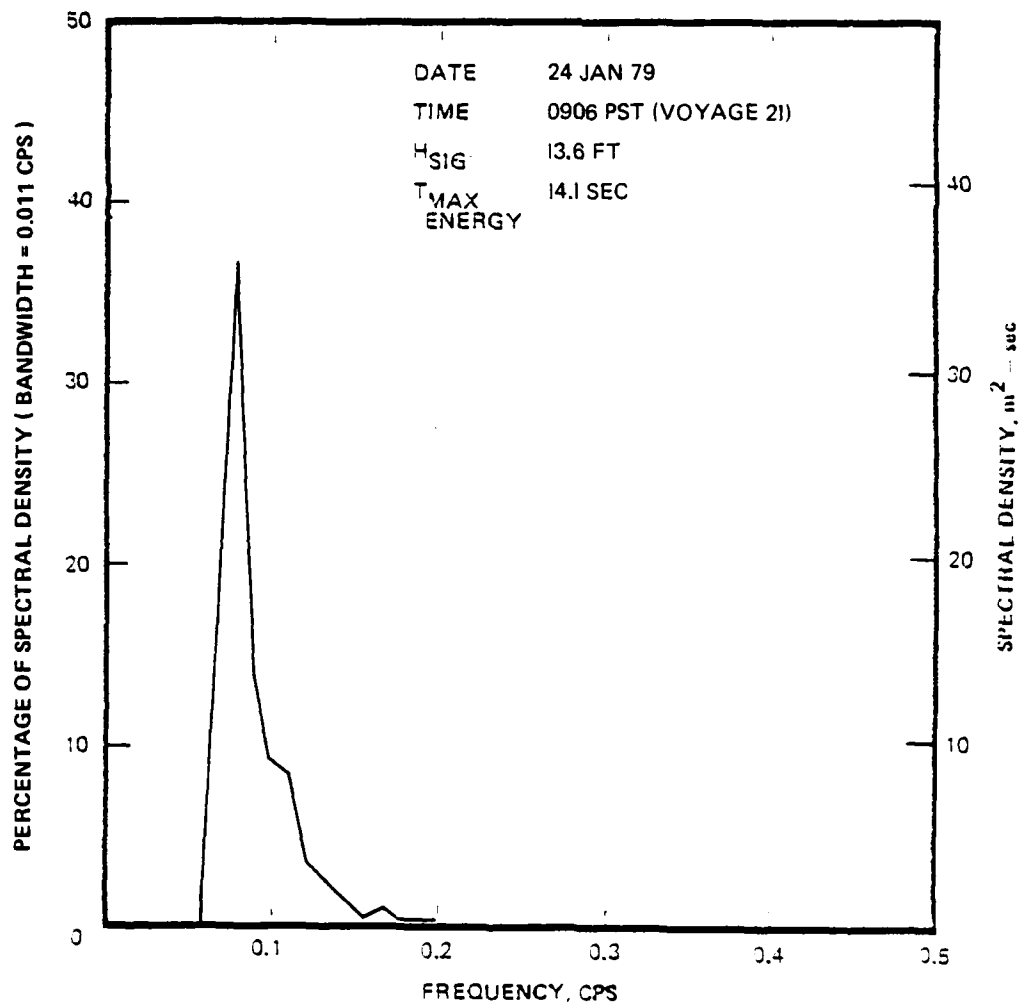
CORRESPONDING VOYAGE NUMBER	DATE	TIME (PST)	WIND		SEA		SWELL		
			DIRECTION (°T)	SPEED (knots)	HEIGHT ($\frac{1}{2}$ -meters)	PERIOD (sec)	DIRECTION (°T)	HEIGHT ($\frac{1}{2}$ -meters)	PERIOD (sec)
8	1 Nov 78	1300	310	22	1	2	270	3	6
9	4 Nov 78	1000	50	10	0	0	270	3	6
10	9 Nov 78	0400	40	15	0	0	270	3	6
10	9 Nov 78	0700	50	20	1	2	270	3	6
11	10 Nov 78	1300	360	22	1	2	270	3	6
11	10 Nov 78	1600	60	16	1	2	270	2	6
12	28 Nov 78	1300	180	15	0	0	240	2	7
13	3 Dec 78	0400	190	17	1	1	270	2	7
13	3 Dec 78	0700	180	25	2	5	240	3	7
14	4 Dec 78	1600	340	27	2	4	290	4	6
15	15 Dec 78	0400	270	11	0	0	270	5	6
15	15 Dec 78	0700	260	9	0	0	270	5	6
16	17 Dec 78	1300	160	12	2	3	270	6	7
16	17 Dec 78	1600	140	5	1	3	270	5	7
17	30 Dec 78	0100	70	16	1	5	280	2	7
18									
19									
20			--NO DATA--						
21	24 Jan 79	0700	90	12	0	0	270	2	7
22	28 Jan 79	0400	60	15	0	0	300	4	6
22	28 Jan 79	0700	50	12	0	0	280	3	5
23	7 Feb 79	2200	160	12	0	0	250	3	6
23	8 Feb 79	0100	150	13	1	4	250	3	6
24	11 Feb 79	1000	180	18	1	N/A	230	3	7
25	22 Feb 79	2200	80	16	1	3	280	2	6
26	27 Feb 79	1300	220	9	0	0	240	3	6
27									
28	22 Mar 79	0400	90	--NO DATA--			300	2	7
29	23 Mar 79	0700	70	10	0	0	330	2	7
29	23 Mar 79	1000	10	8	0	0	300	2	7

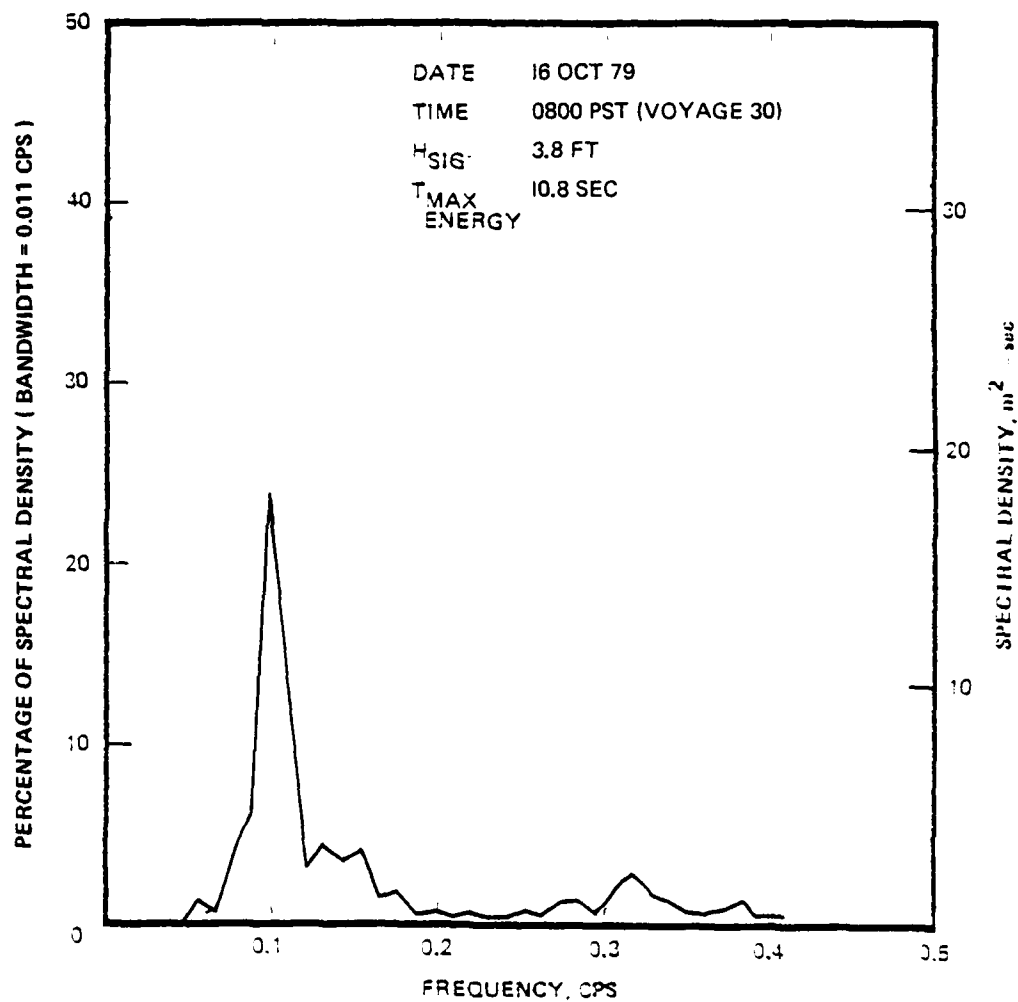
SUMMARY OF WAVE SPECTRA AND WIND DATA

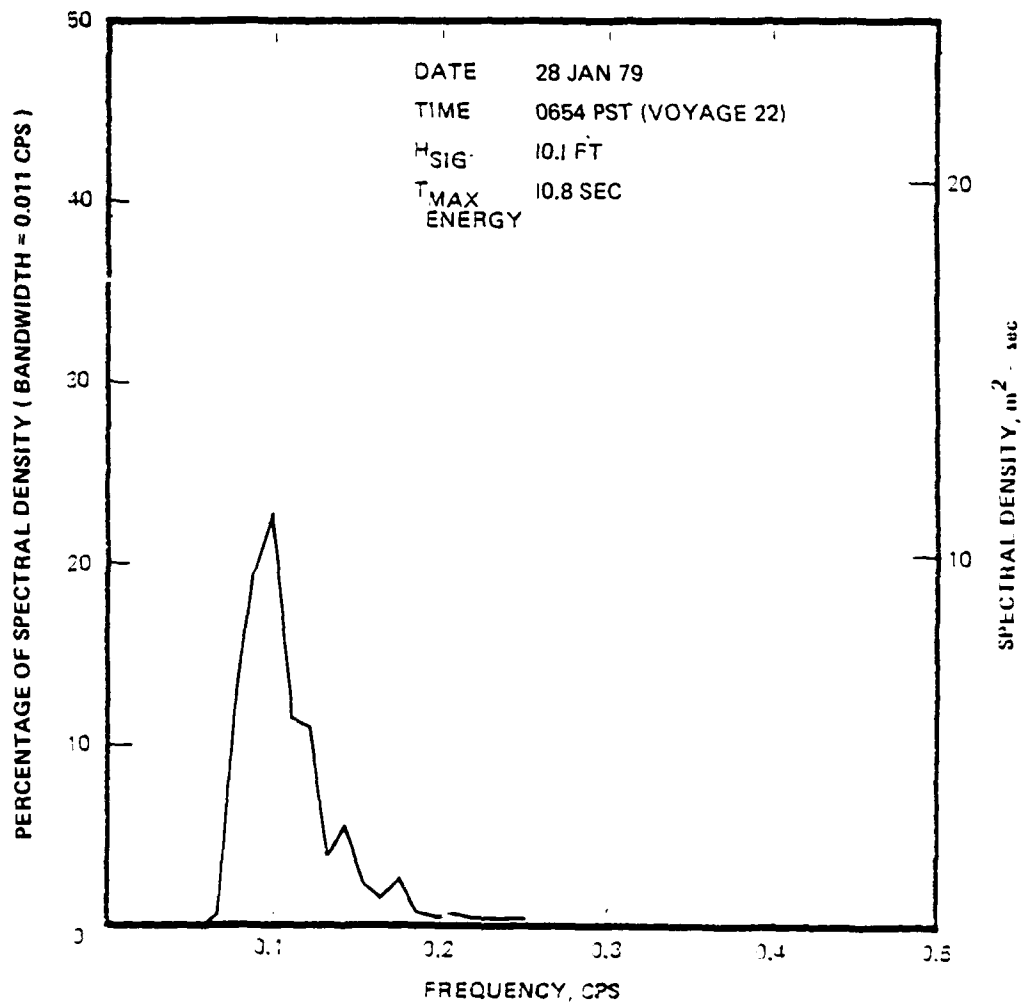
CORRESPONDING VOYAGE NUMBER	DATE	TIME (PST)	WIND		WAVE SPECTRA DATA	
			SPEED (KNOTS)	DIRECTION (°T)	SIGNIFICANT HEIGHT (FT)	PERIOD (SEC)
20	21 JAN 79	0357	--	--	9.7	12.3
21	24 JAN 79	0906	--	--	13.6	14.1
22	28 JAN 79	0654	--	--	10.1	10.8
30	16 OCT 79	0800	--	--	3.8	10.8
31	17 OCT 79	1700	--	--	9.0	14.1
32	--	--	--	--	--	--
33	14 NOV 79	2000	--	--	3.9	8.3
34	17 NOV 79	2300	--	--	7.2	9.1
35	21 NOV 79	0500	--	--	9.8	12.5
36	26 NOV 79	0900	--	--	7.4	8.3
37	28 NOV 79	2100	--	--	7.8	12.5
38	03 DEC 79	1400	--	--	12.6	7.7
39	16 DEC 79	0800	--	--	4.3	9.1
40	18 DEC 79	0900	--	--	12.9	11.1
41	20 JAN 80	1200	6.7	100.6	4.0	16.7
42	24 JAN 80	0800	0.2	321.0	5.3	11.1
43	04 FEB 80	1400	5.8	73.2	7.5	12.5
44	06 FEB 80	1300	11.6	267.5	14.3	11.1
45	10 FEB 80	0500	8.0	99.1	5.5	12.5
46	--	--	--	--	--	--
47	04 MAR 80	1800	6.2	173.9	6.3	14.4
48	10 MAR 80	2100	8.1	317.8	7.9	6.3
49	18 MAR 80	2300	5.1	278.4	9.6	12.5
50	22 MAR 80	1300	7.3	241.8	8.0	14.3
51	26 MAR 80	1000	9.8	295.2	9.9	14.3
52	--	--	--	--	--	--
53	--	--	--	--	--	--

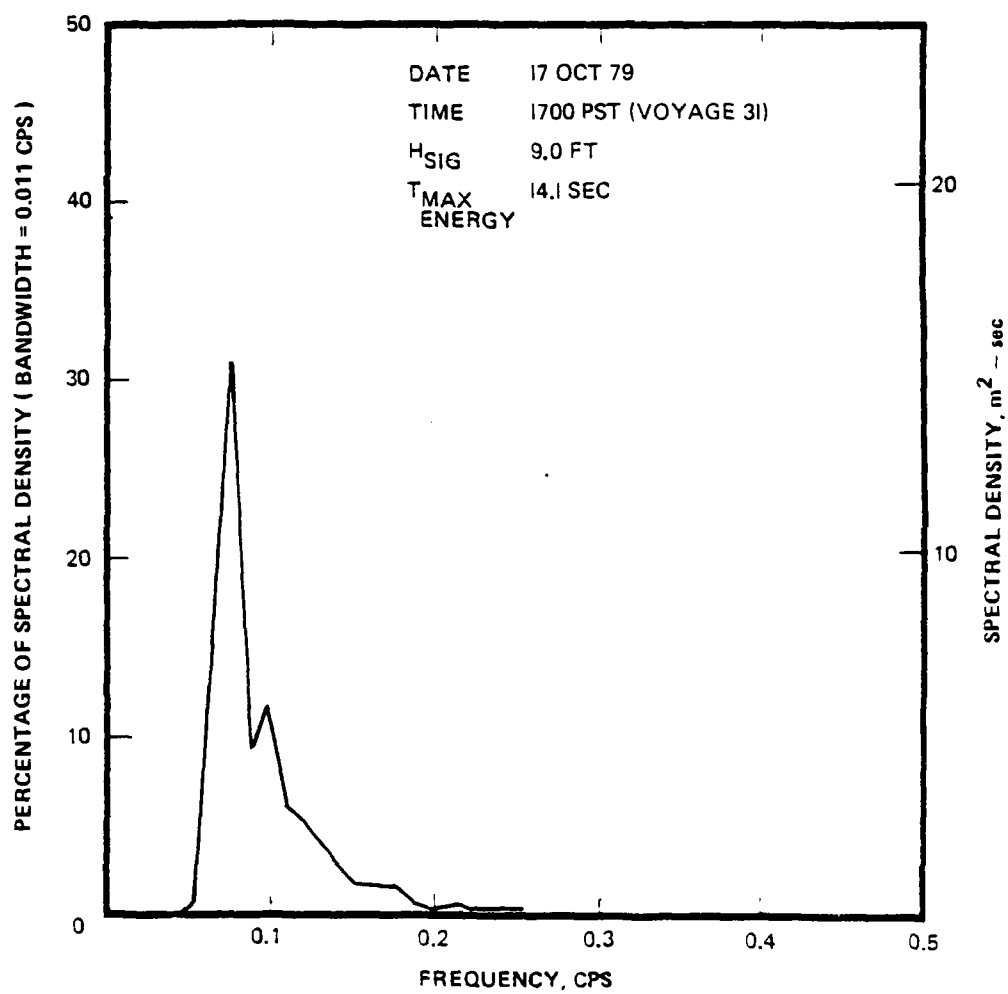
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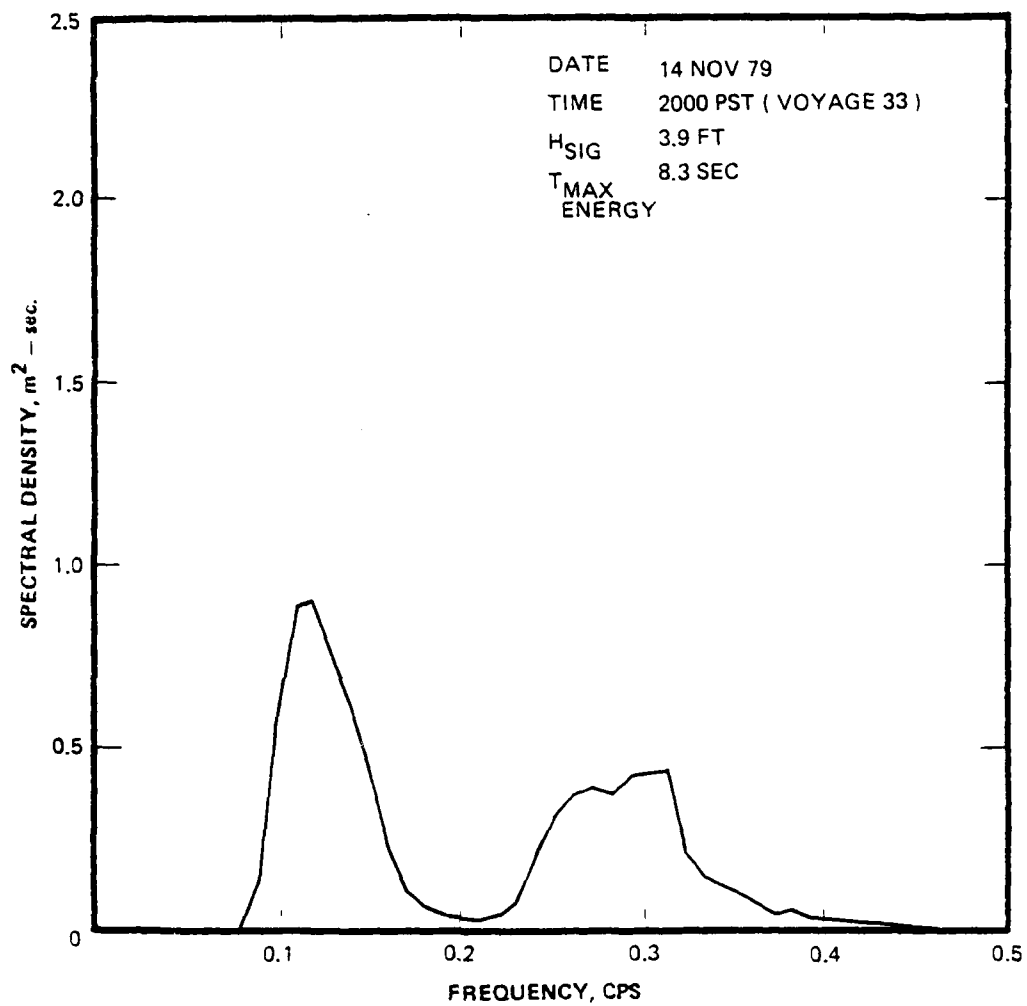


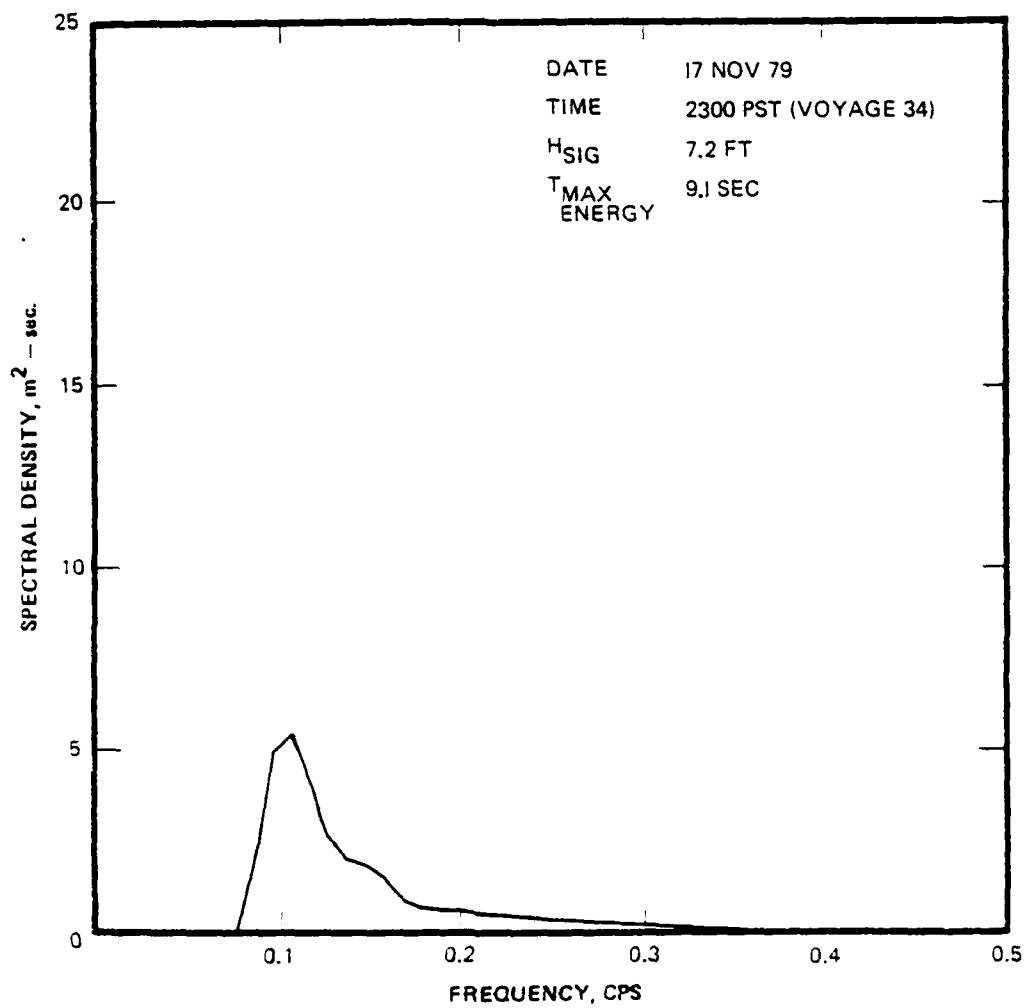


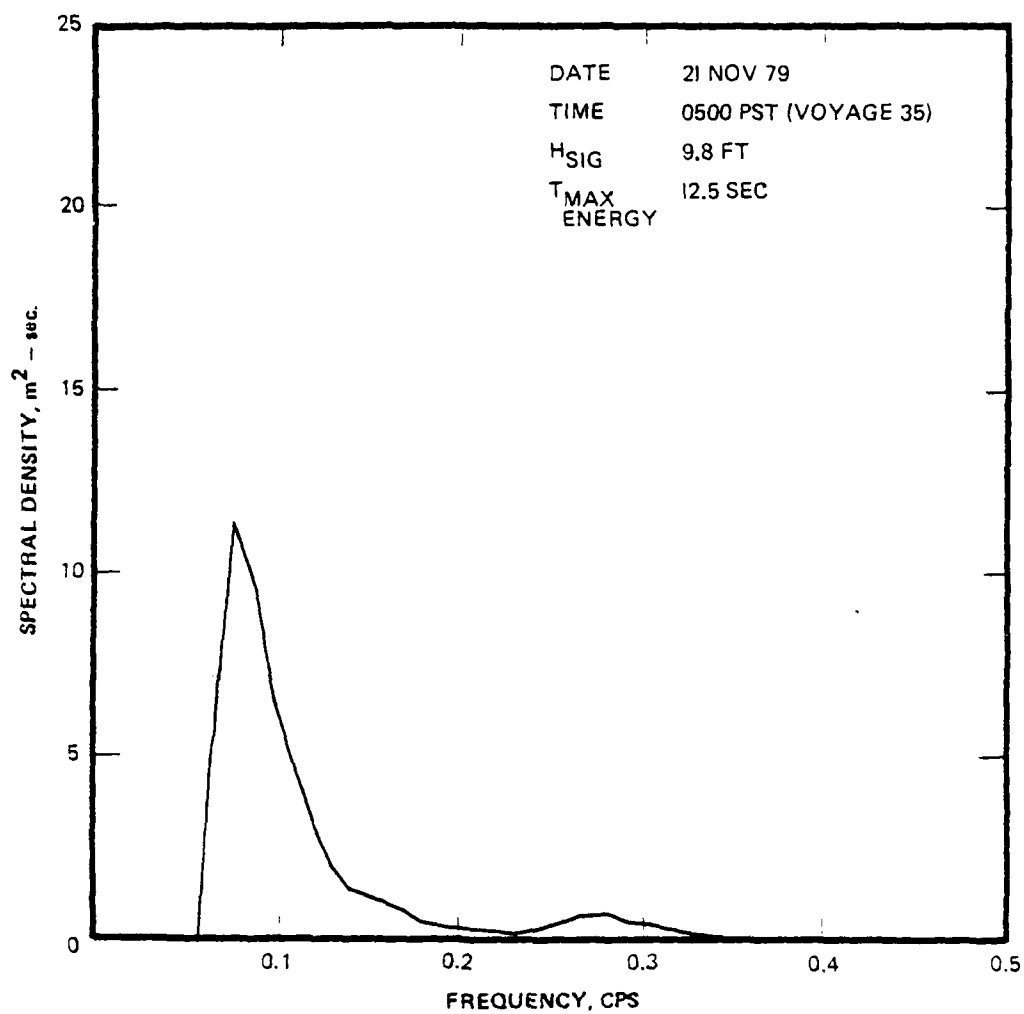


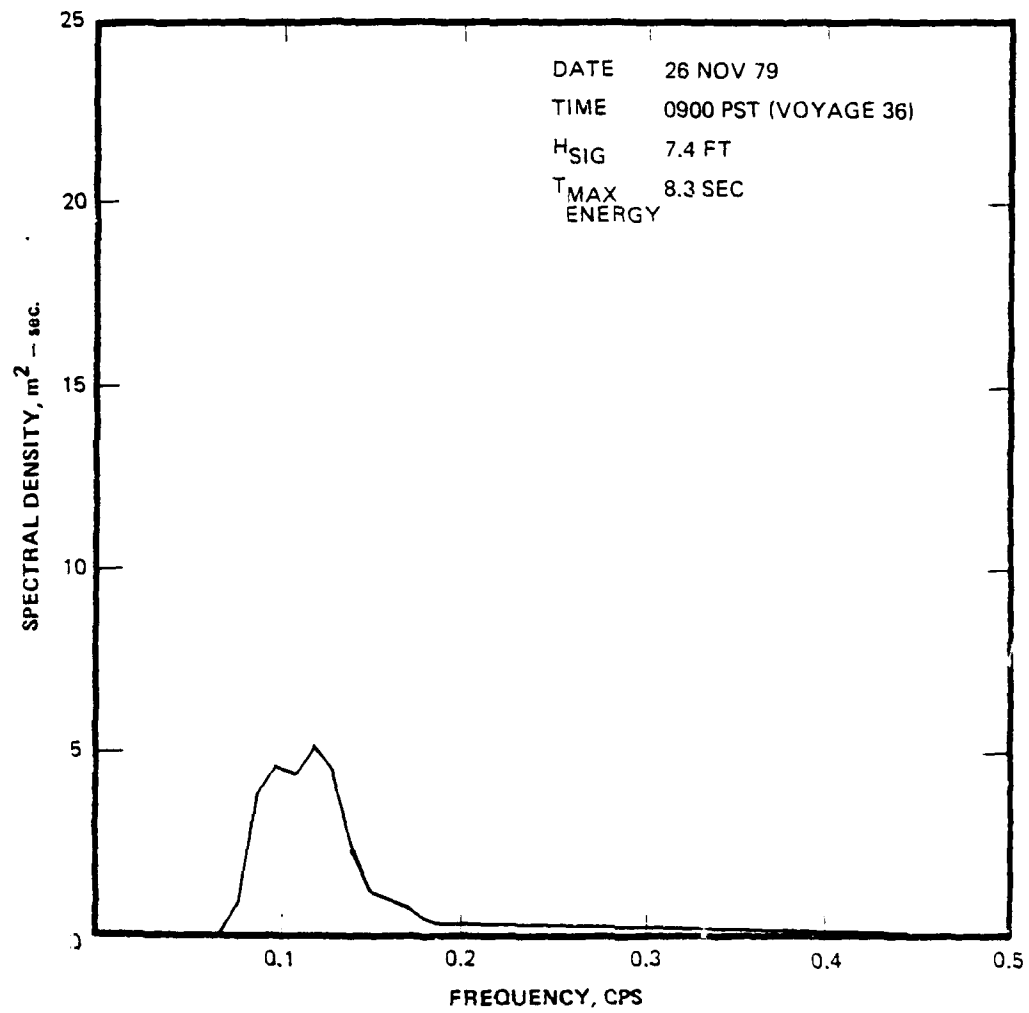












AD-A096 986

TETRA TECH INC PASADENA CA

F/G 13/10

COLUMBIA RIVER ENTRANCE CHANNEL DEEP-DRAFT VESSEL MOTION STUDY.--ETC(U)

SEP 80 S WANG, M KIMBLE, C BUTCHER, G D COX

DACW57-78-C-0028

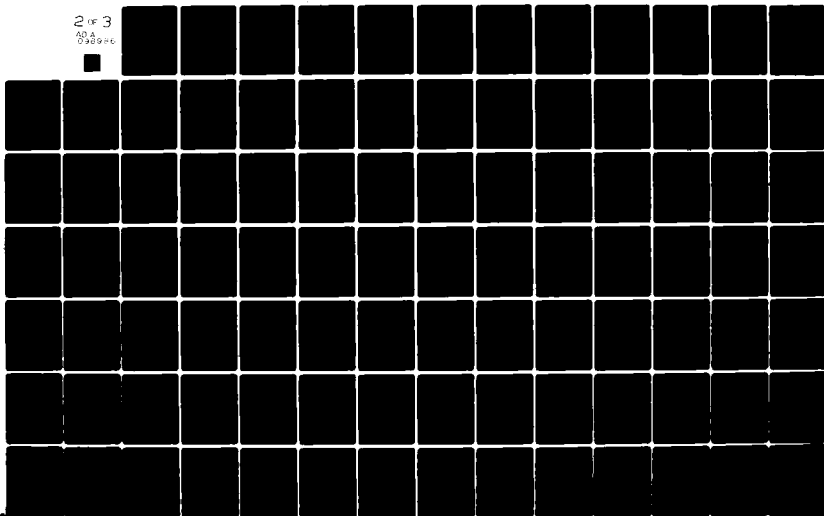
UNCLASSIFIED

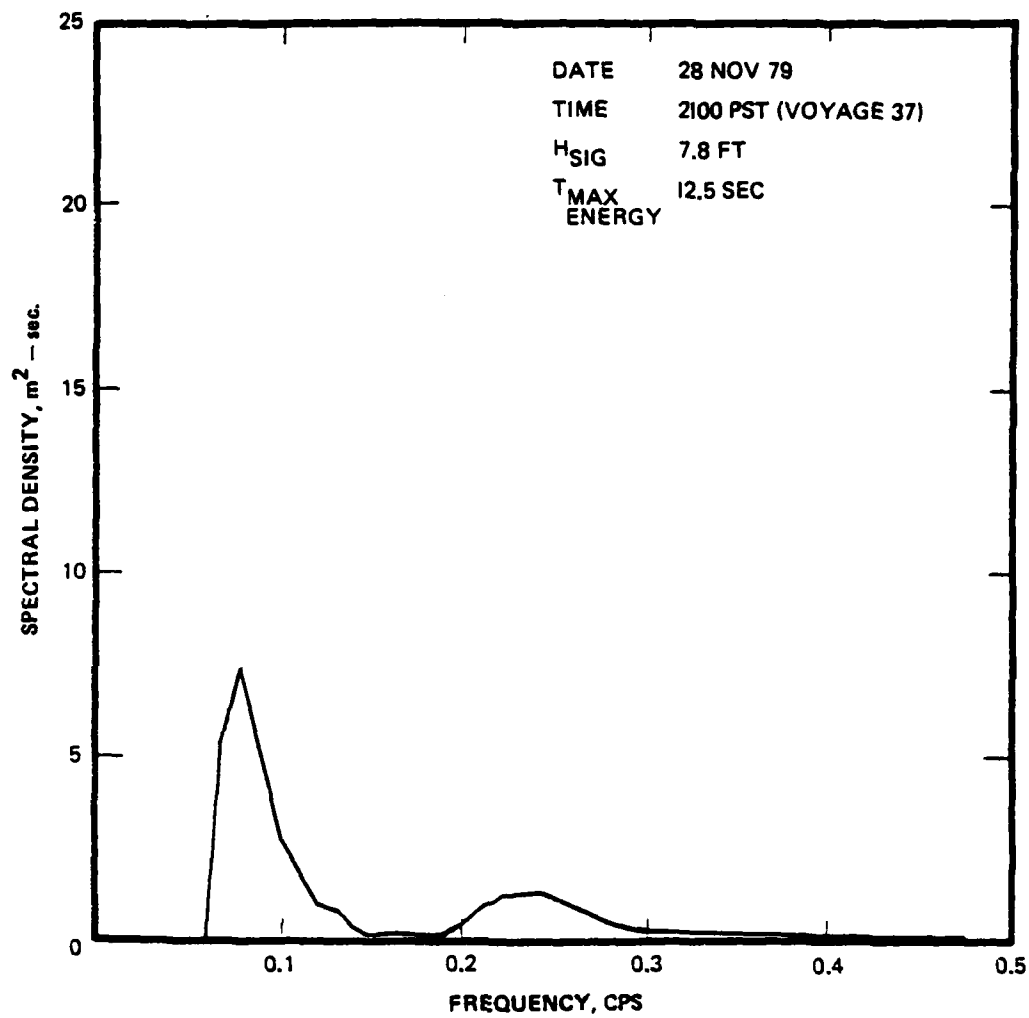
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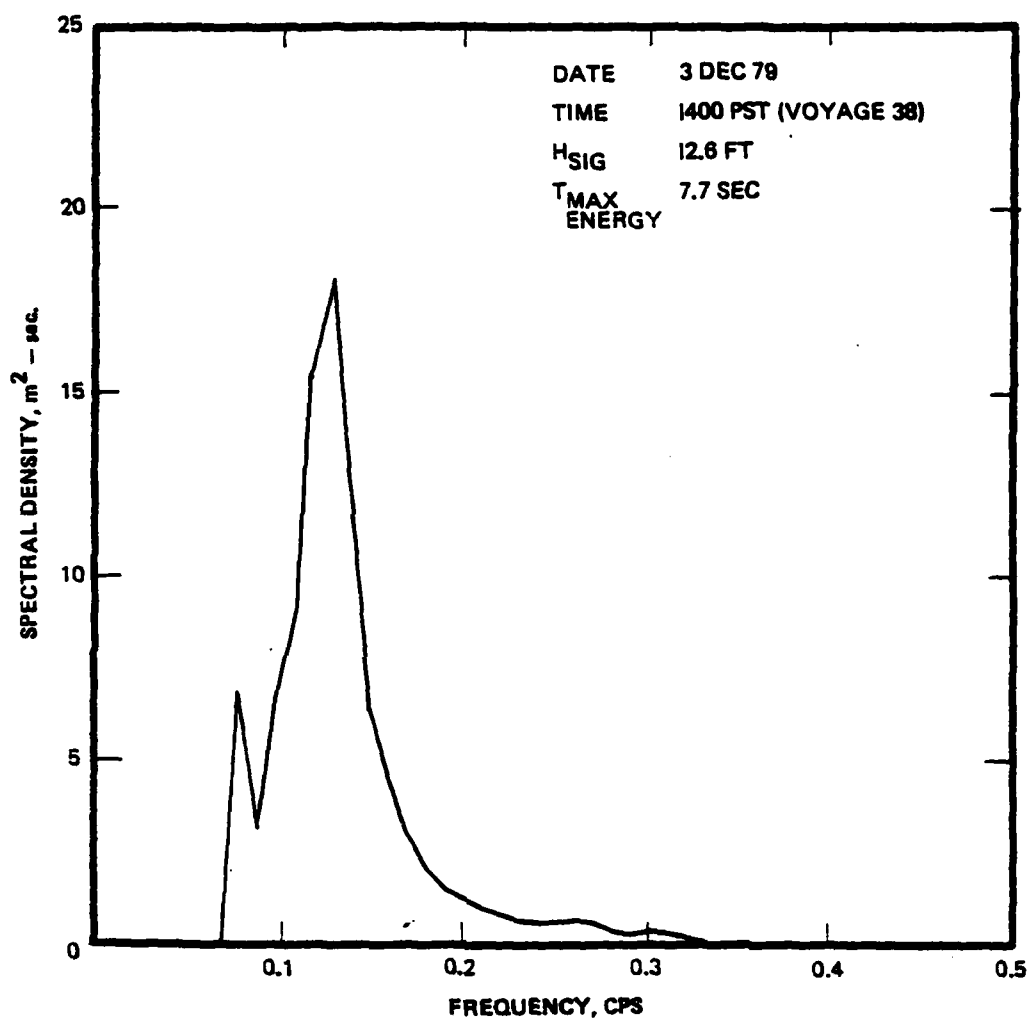
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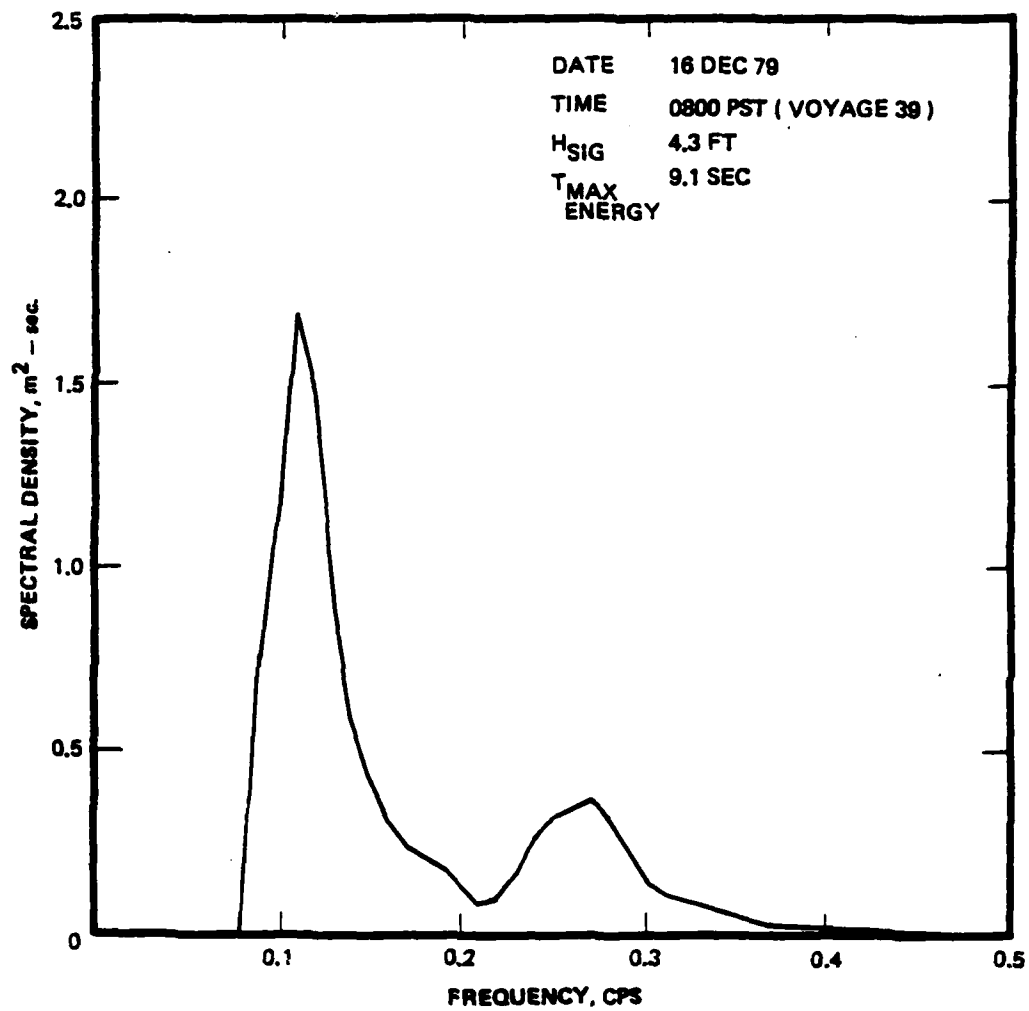
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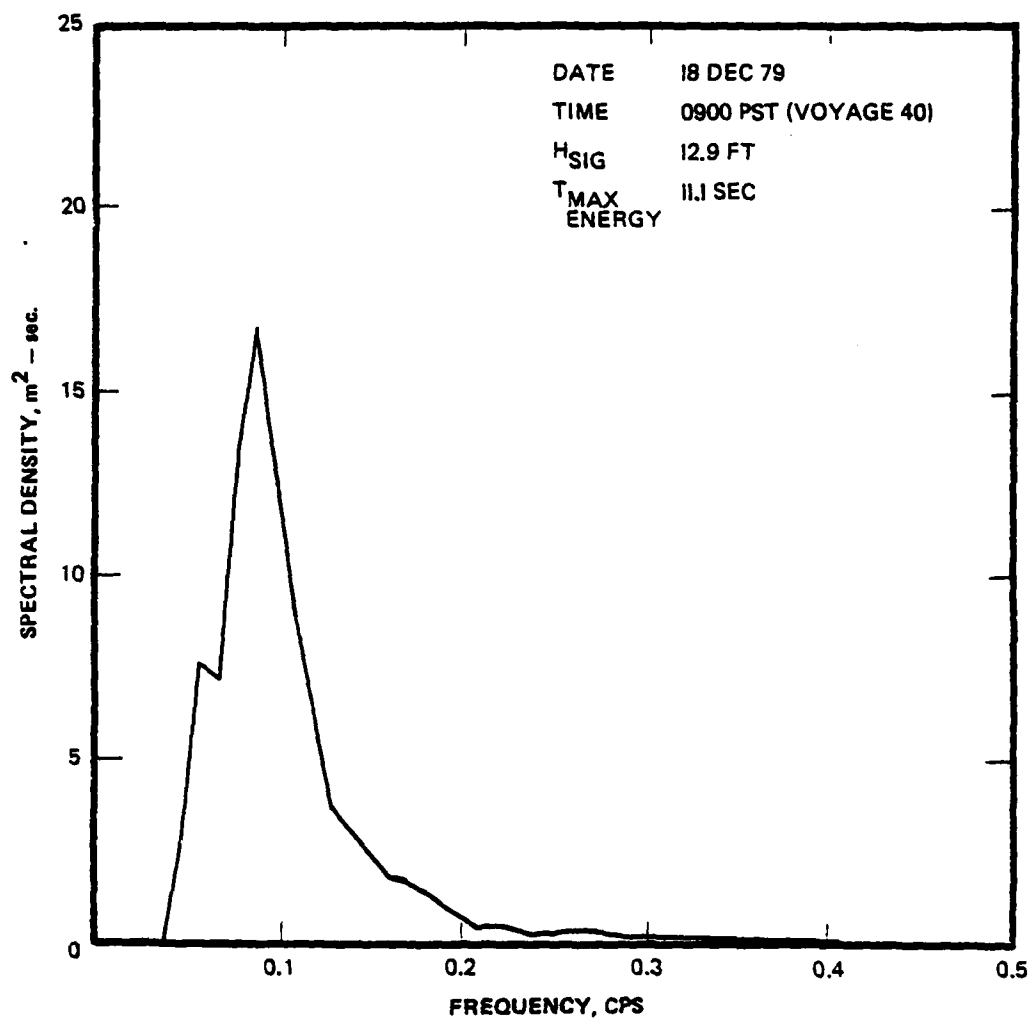
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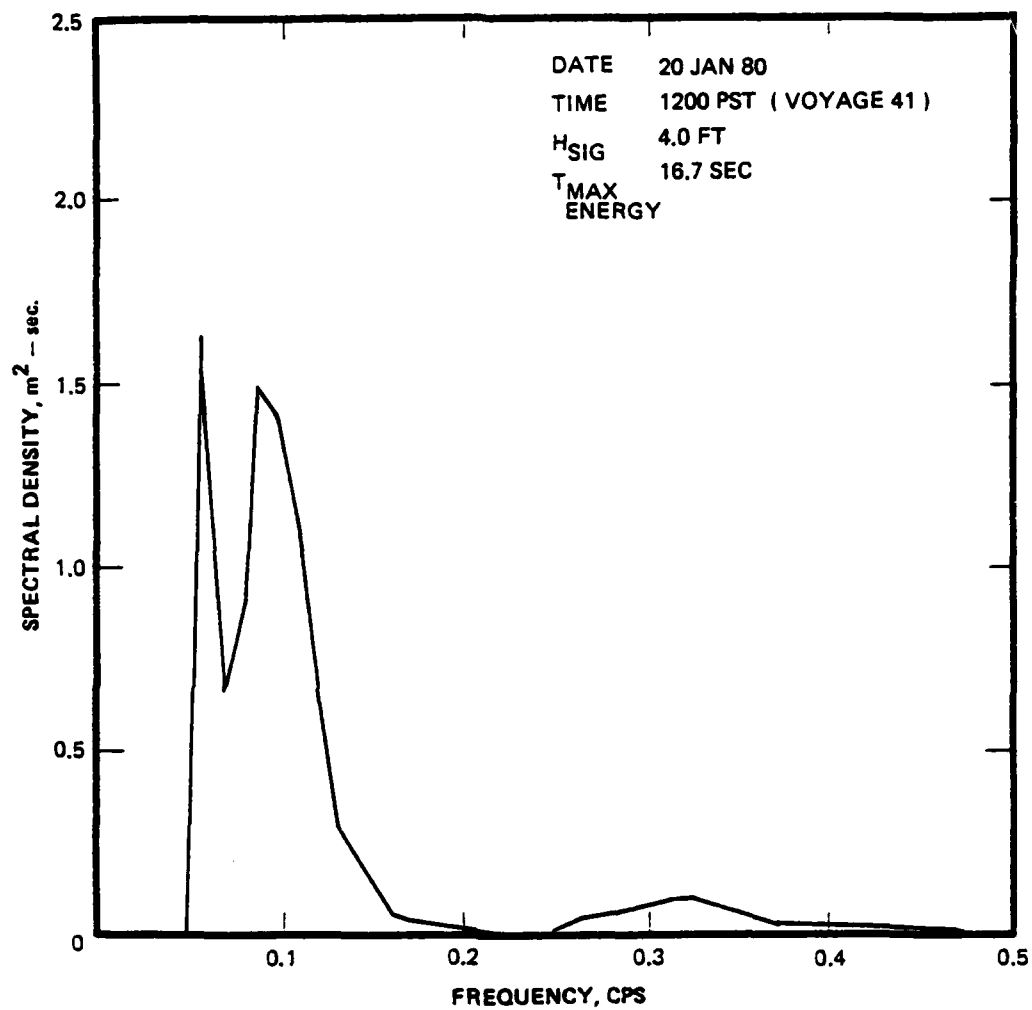


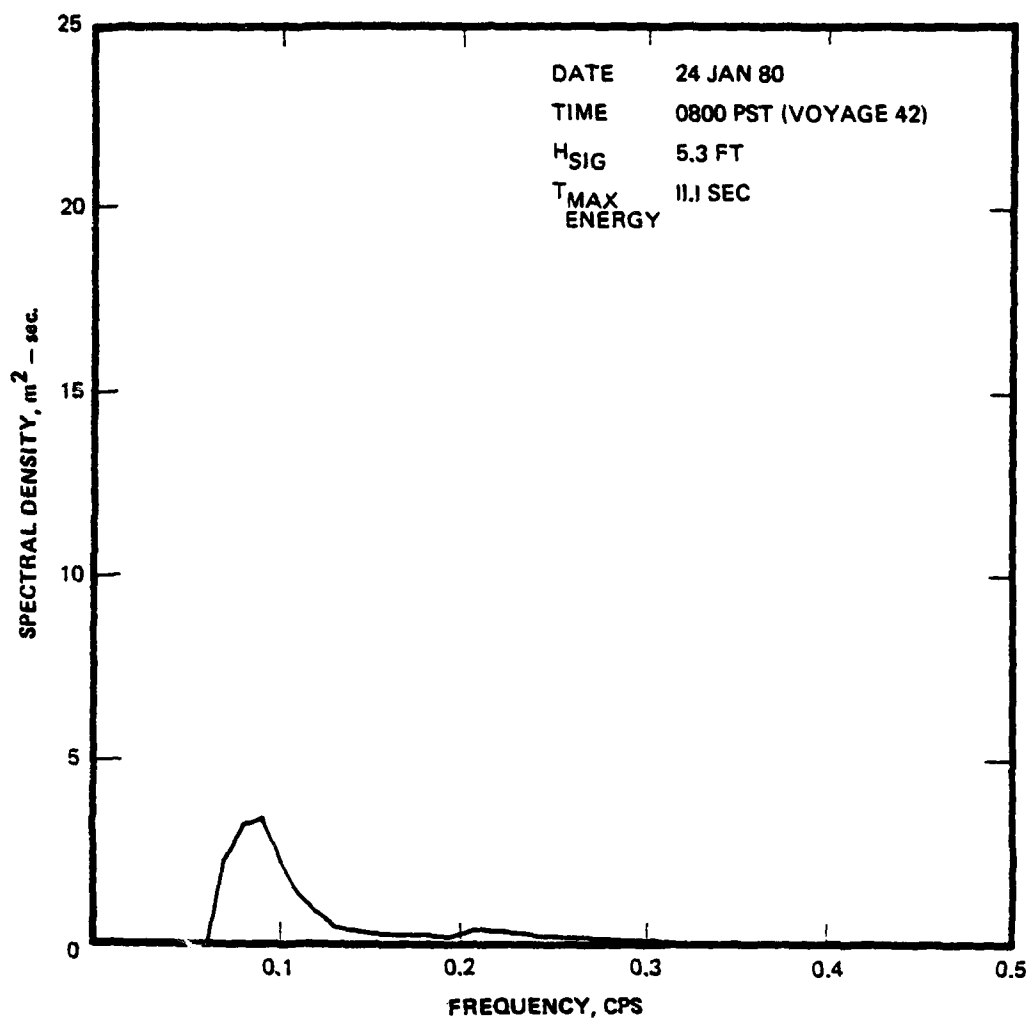


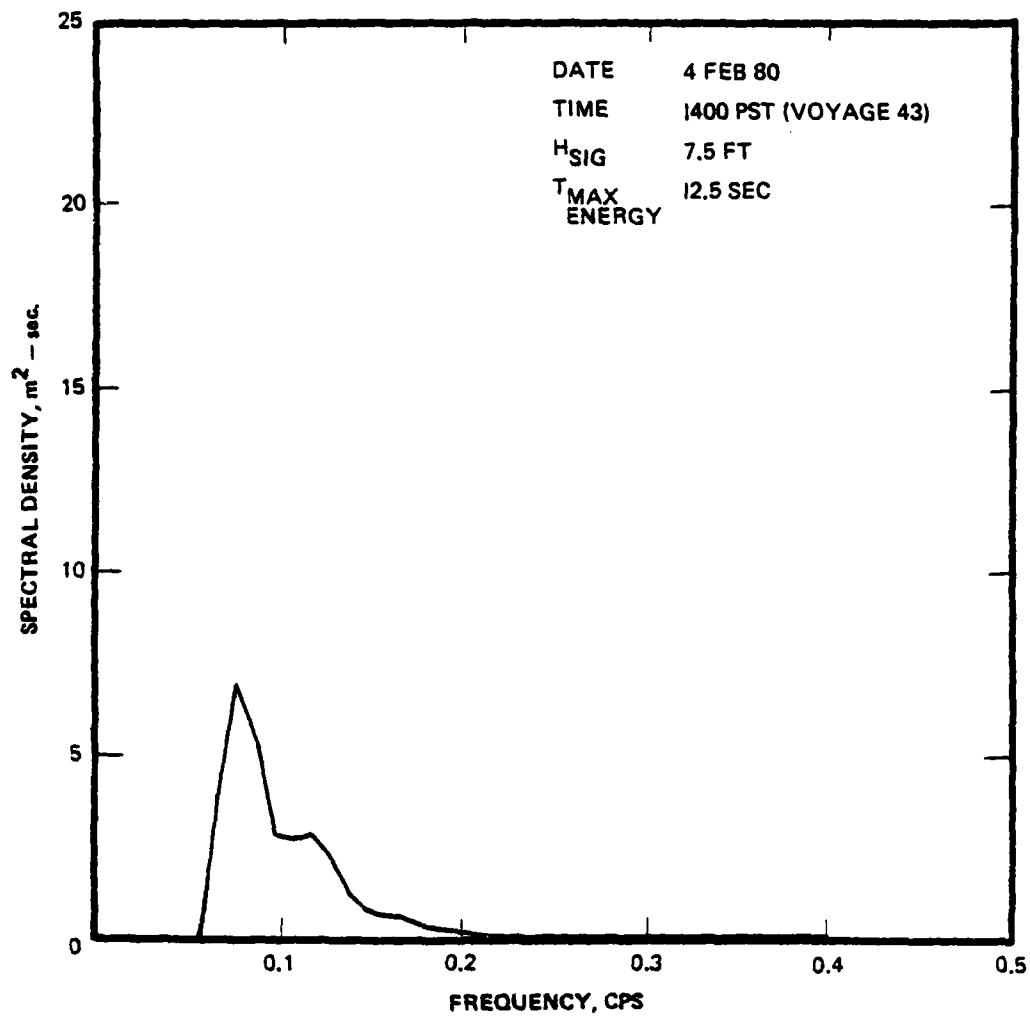


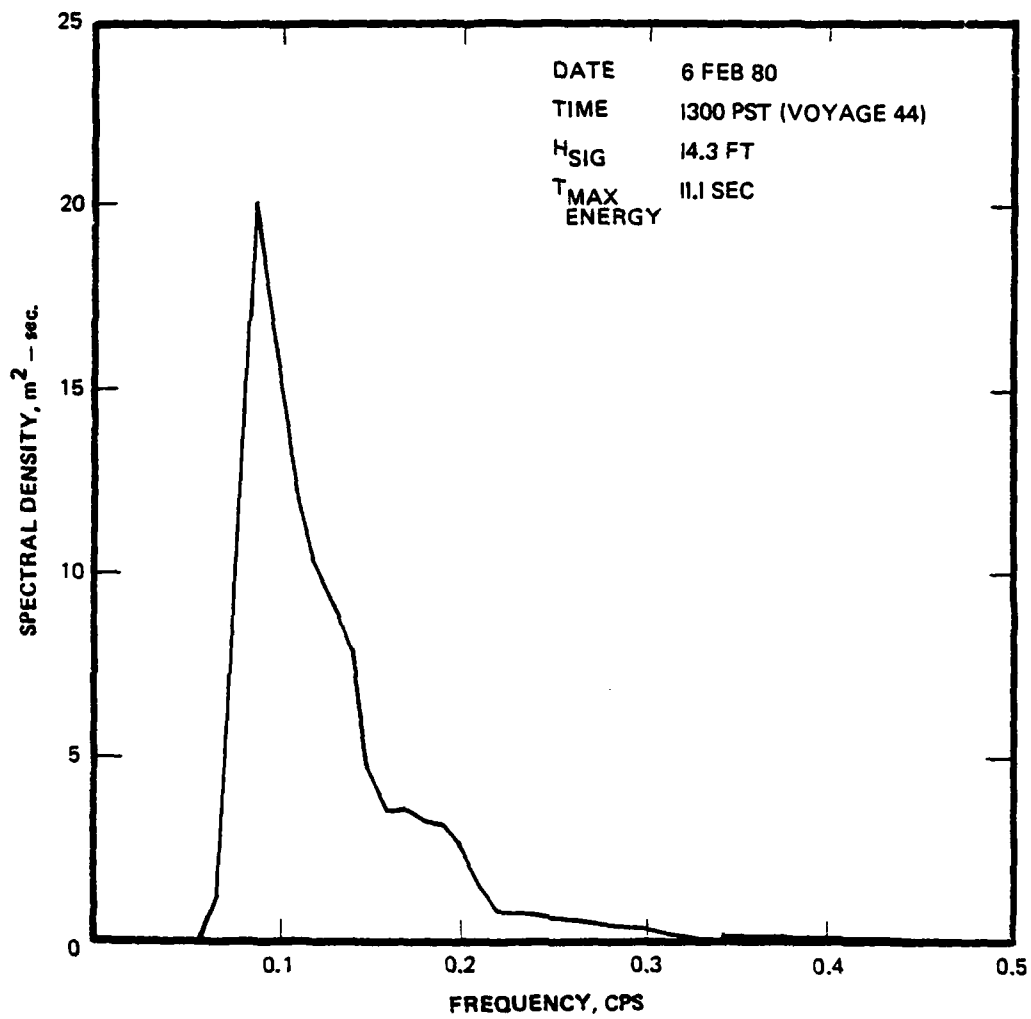


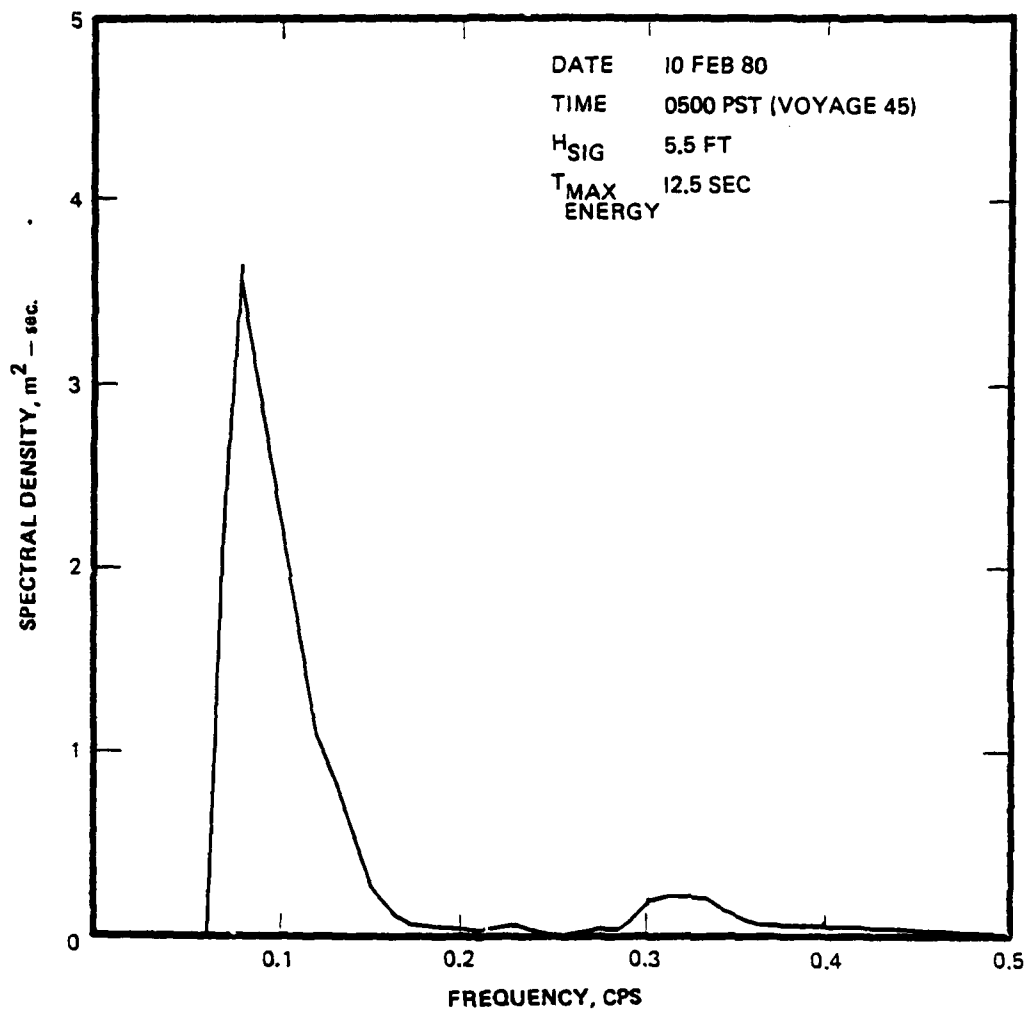


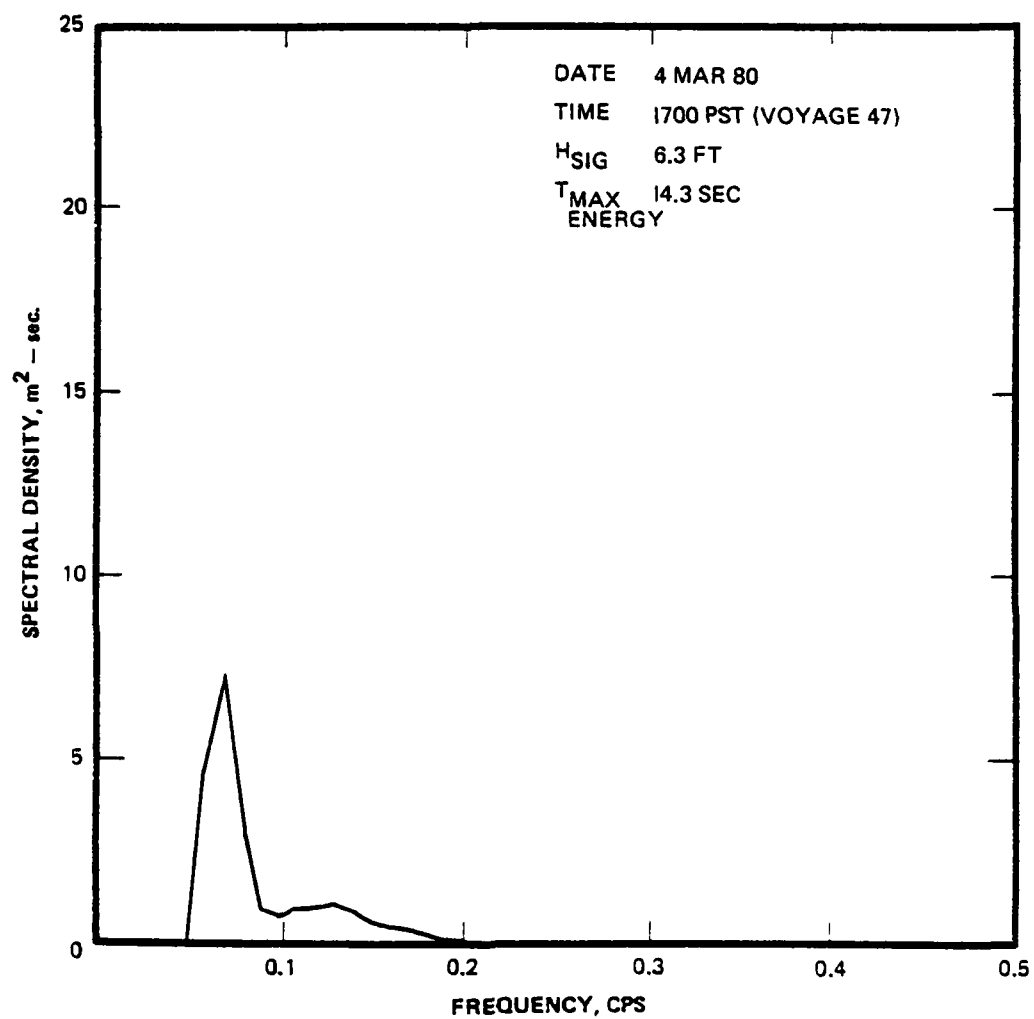


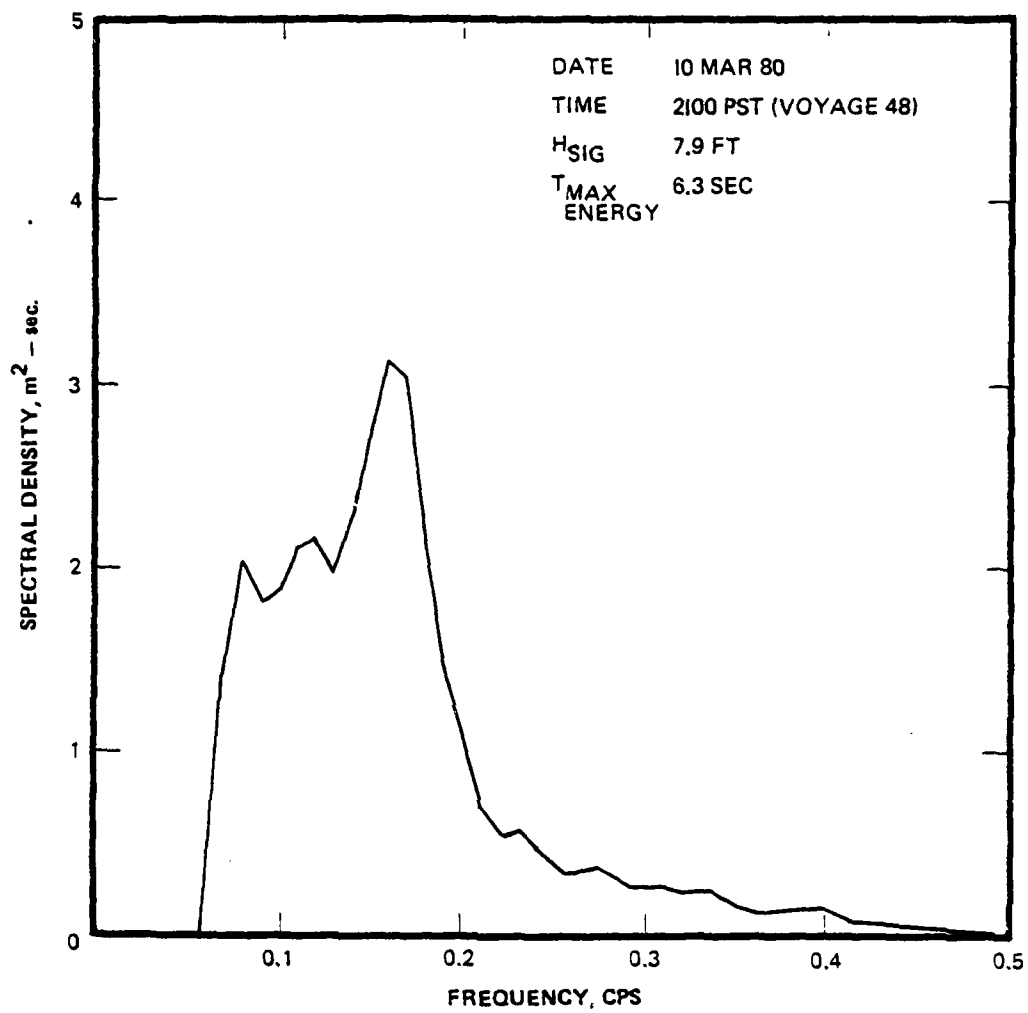


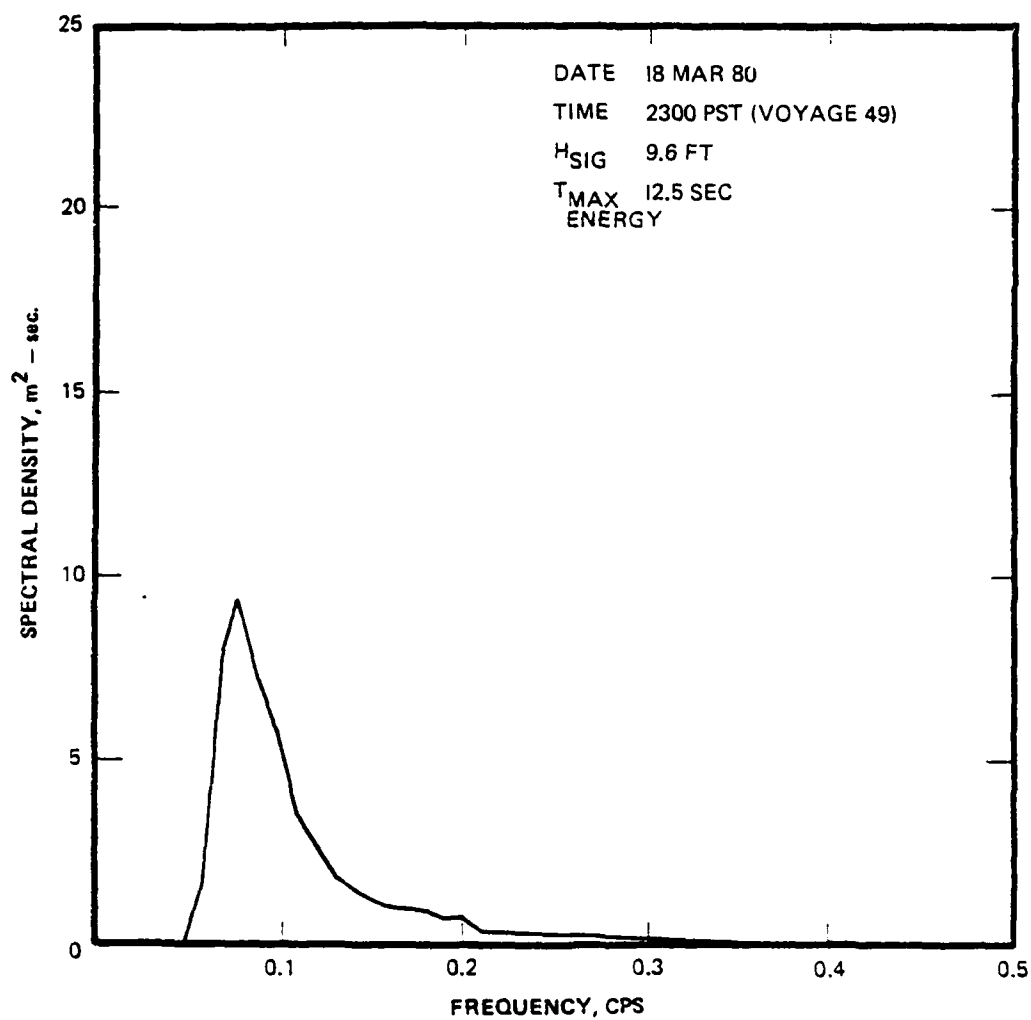


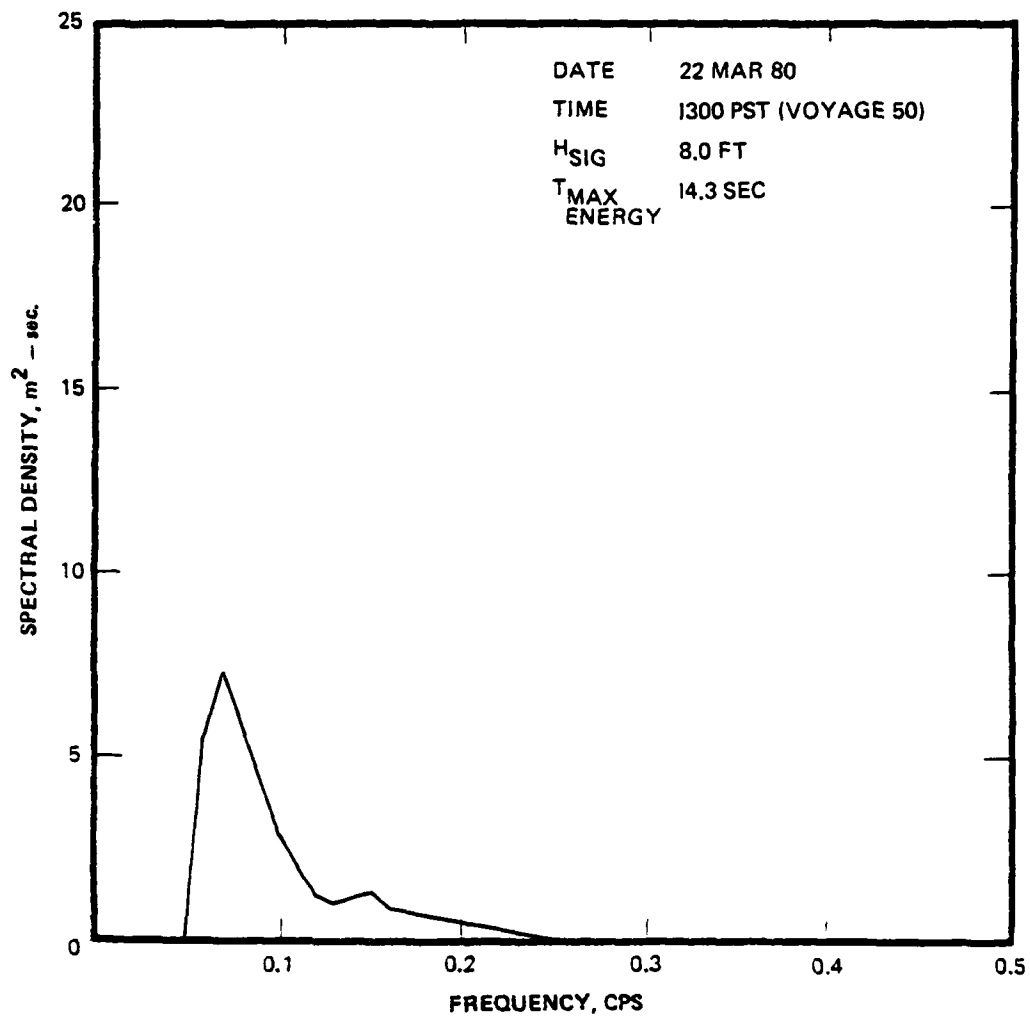


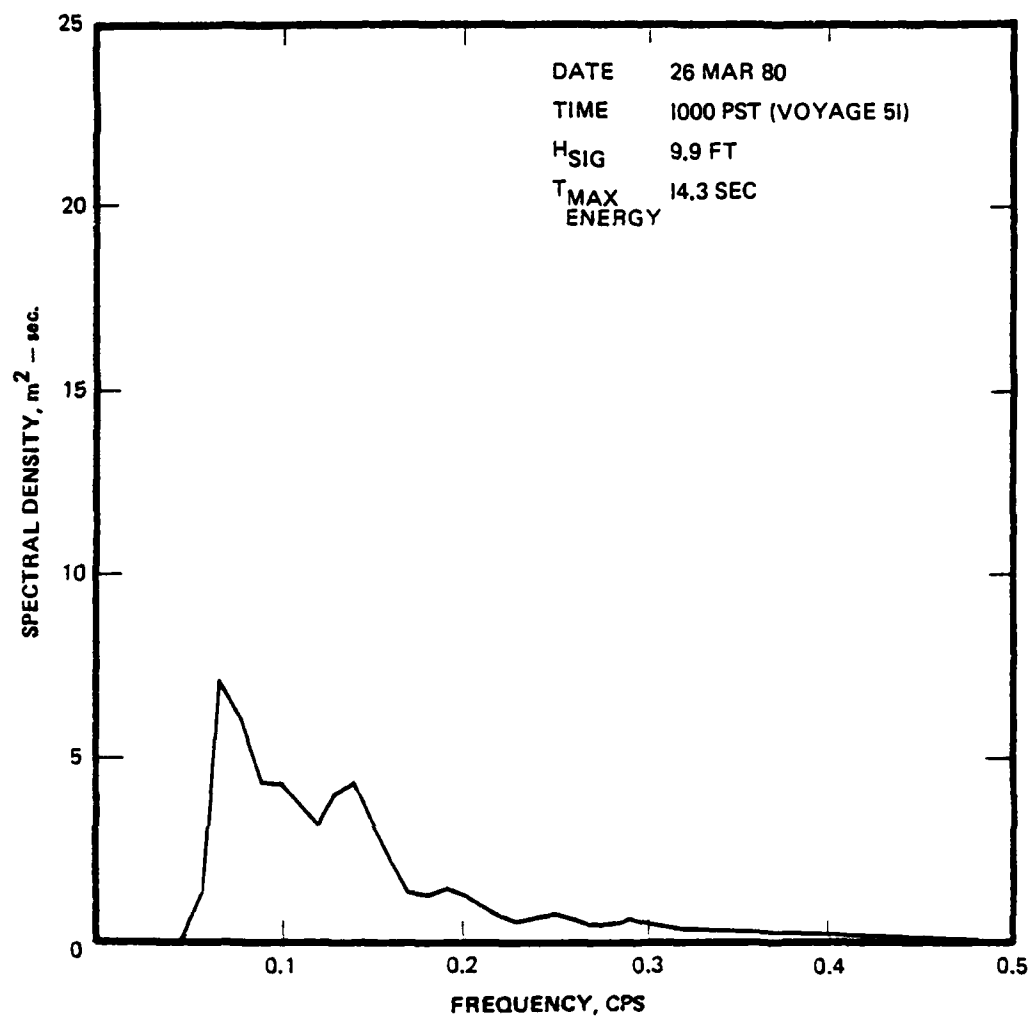












APPENDIX H

TIDE HYDROGRAPH AND RIVER DISCHARGE FOR EACH BAR CROSSING

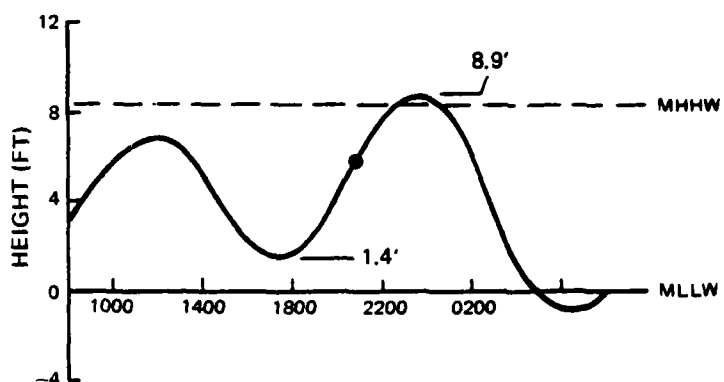
- SOURCES:
1. Observed Tide Heights from National Ocean Survey (NOAA) Gauge at Astoria, Oregon
 2. River Discharge Records for Vancouver, Washington from J.C. Huetter, Acting Chief, Engineering Division, U.S. Army Engineering District, Portland, May 1979, May 1980, Personal Communication.
 3. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, 1980: Tide Tables 1979, High and Low Water Predictions, West Coast of North America and South America.

Note: Observed tide data for April 1980 was unavailable at the time of writing. Therefore, tide hydrographs for Voyage Nos. 52 and 53 are based on predicted tide heights from source [3] cited above.

VOYAGE NO. 1

TIDE HYDROGRAPH FOR
20 - 21 MAY 1978

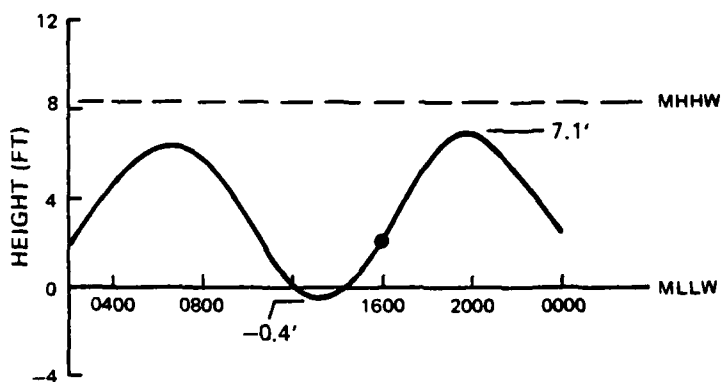
RIVER DISCHARGE = 232,000 CFS



VOYAGE NO. 2

TIDE HYDROGRAPH FOR
29 - 30 MAY 1978

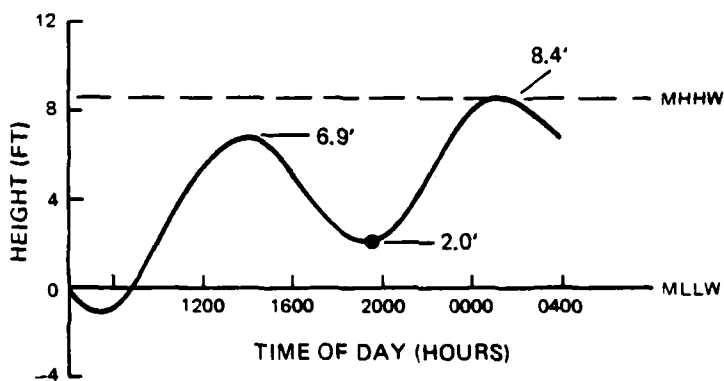
RIVER DISCHARGE = 210,000 CFS



VOYAGE NO. 3

TIDE HYDROGRAPH FOR
5 - 6 JUNE 1978

RIVER DISCHARGE = 219,000 CFS

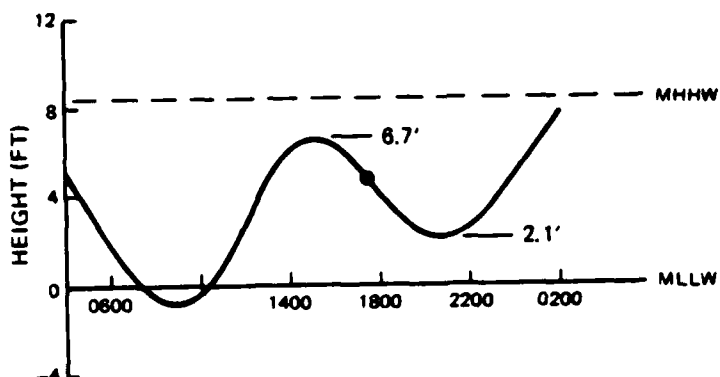


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 4

TIDE HYDROGRAPH FOR
7 - 8 JUNE 1978

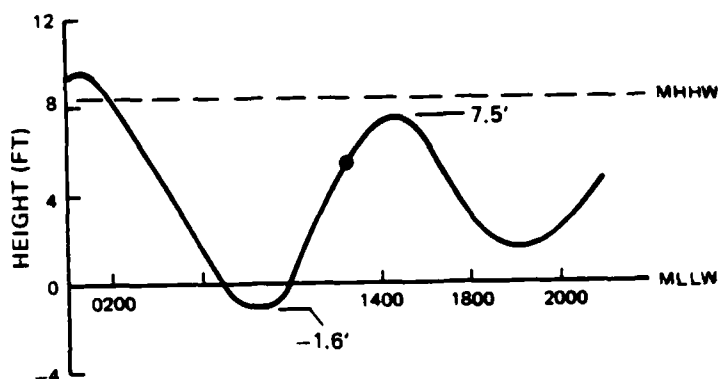
RIVER DISCHARGE = 217,000 CFS



VOYAGE NO. 5

TIDE HYDROGRAPH FOR
21 JUNE 1978

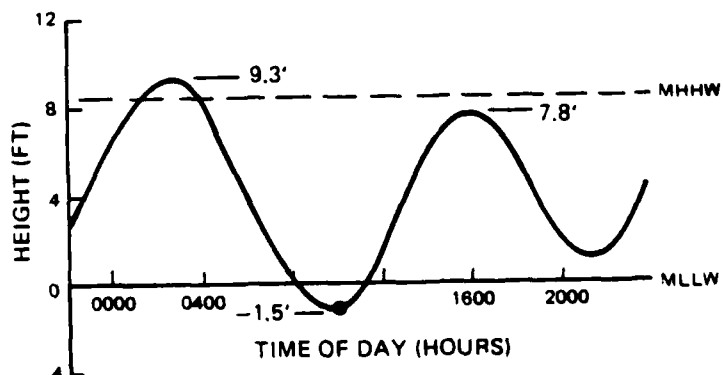
RIVER DISCHARGE = 247,000 CFS



VOYAGE NO. 6

TIDE HYDROGRAPH FOR
22 - 23 JUNE 1978

RIVER DISCHARGE = 219,000 CFS

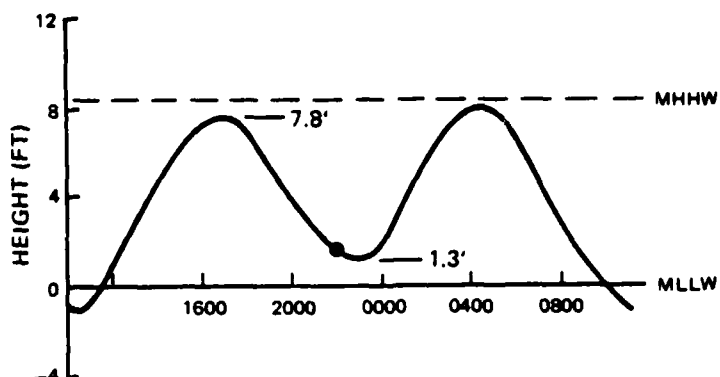


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 7

TIDE HYDROGRAPH FOR
24 - 25 JUNE 1978

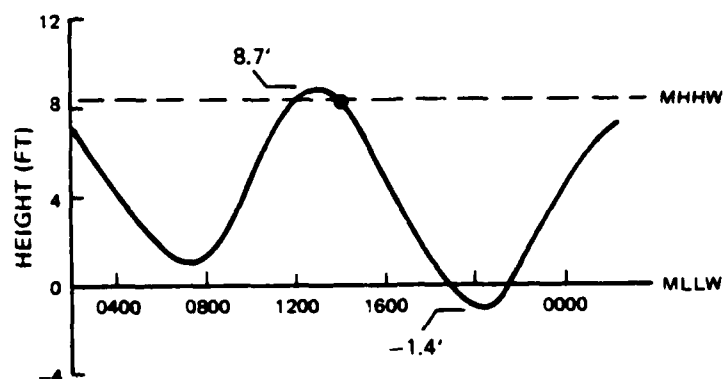
RIVER DISCHARGE = 214,000 CFS



VOYAGE NO. 8

TIDE HYDROGRAPH FOR
1 - 2 NOVEMBER

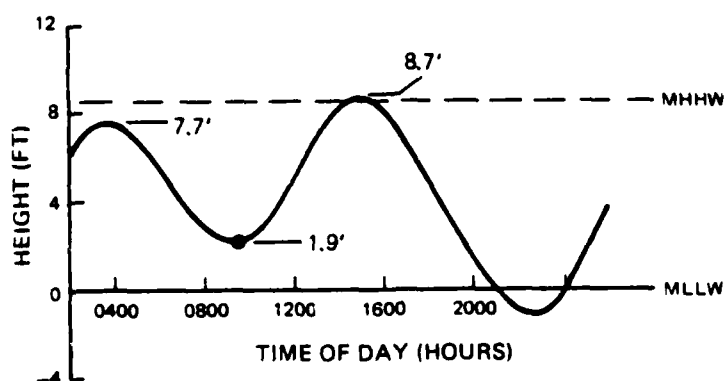
RIVER DISCHARGE = 139,000 CFS



VOYAGE NO. 9

TIDE HYDROGRAPH FOR
4 - 5 NOVEMBER 1978

RIVER DISCHARGE = 166,000 CFS

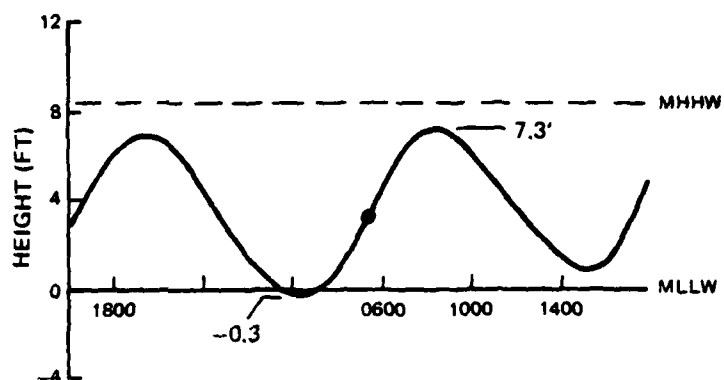


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 10

TIDE HYDROGRAPH FOR
8 - 9 NOVEMBER 1978

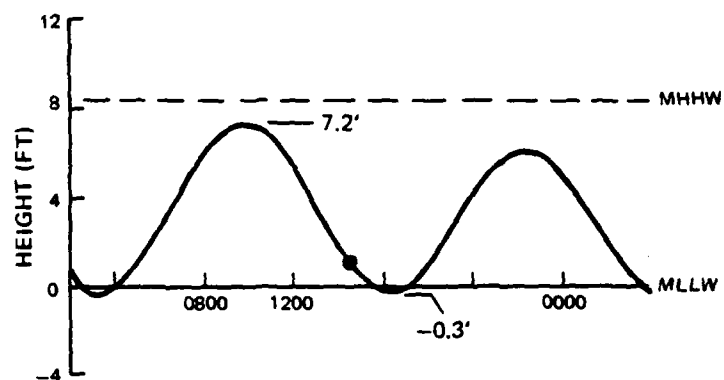
RIVER DISCHARGE = 113,000 CFS



VOYAGE NO. 11

TIDE HYDROGRAPH FOR
10 - 11 NOVEMBER 1978

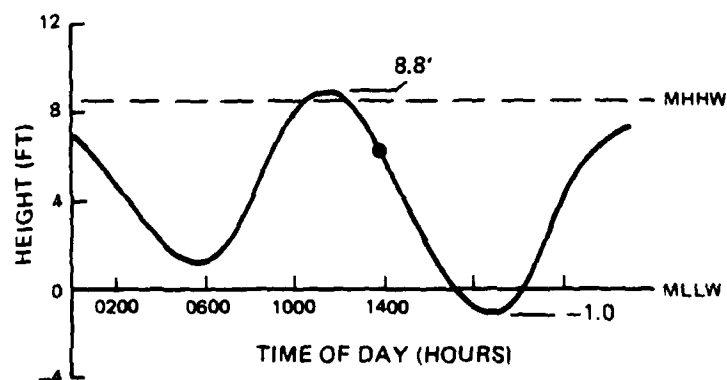
RIVER DISCHARGE = 118,000 CFS



VOYAGE NO. 12

TIDE HYDROGRAPH FOR
28 - 29 NOVEMBER 1978

RIVER DISCHARGE = 190,000 CFS

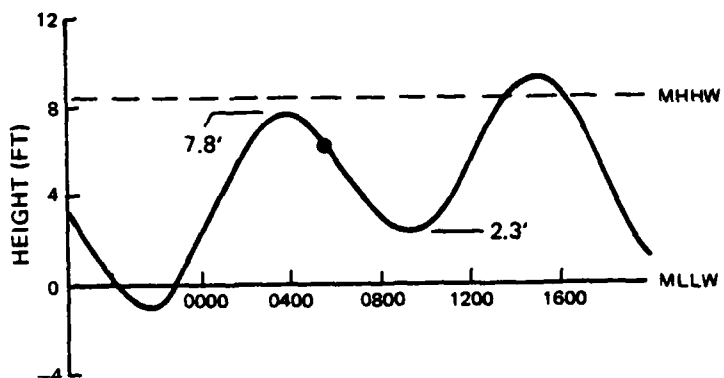


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 13

TIDE HYDROGRAPH FOR
2 - 3 DECEMBER 1978

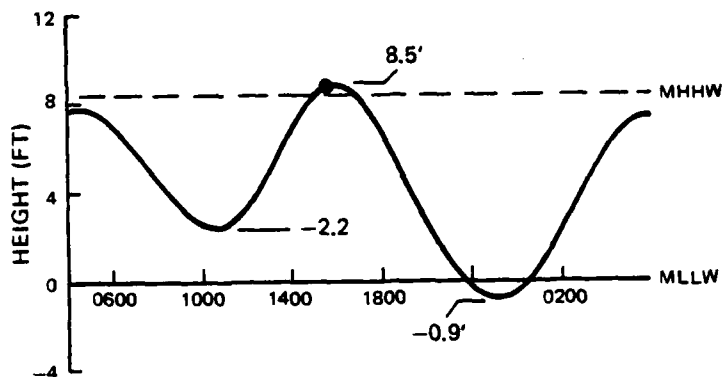
RIVER DISCHARGE = 206,000 CFS



VOYAGE NO. 14

TIDE HYDROGRAPH FOR
4 - 5 DECEMBER 1978

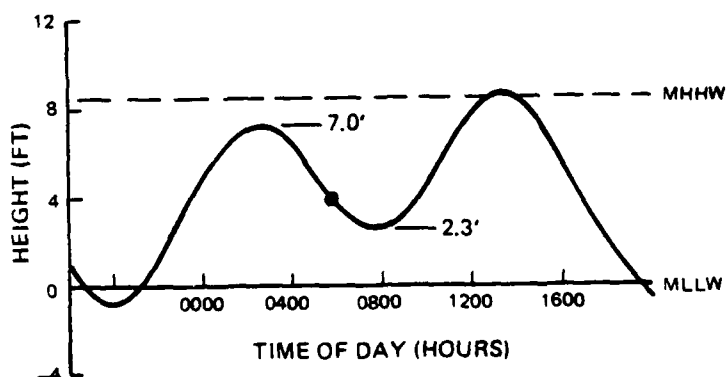
RIVER DISCHARGE = 190,000 CFS



VOYAGE NO. 15

TIDE HYDROGRAPH FOR
14 - 15 DECEMBER 1978

RIVER DISCHARGE = 211,000 CFS

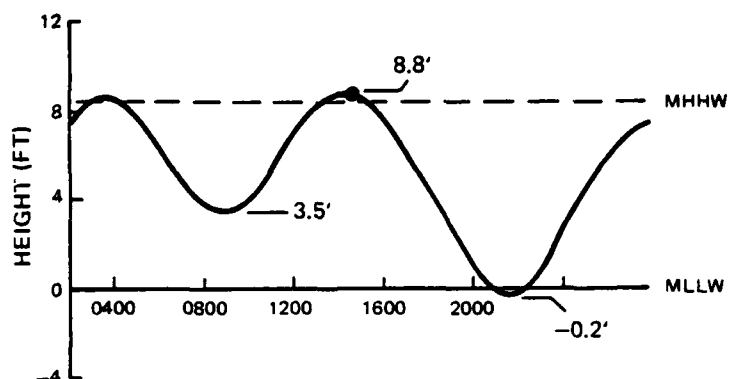


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 16

TIDE HYDROGRAPH FOR
17 - 18 DECEMBER 1978

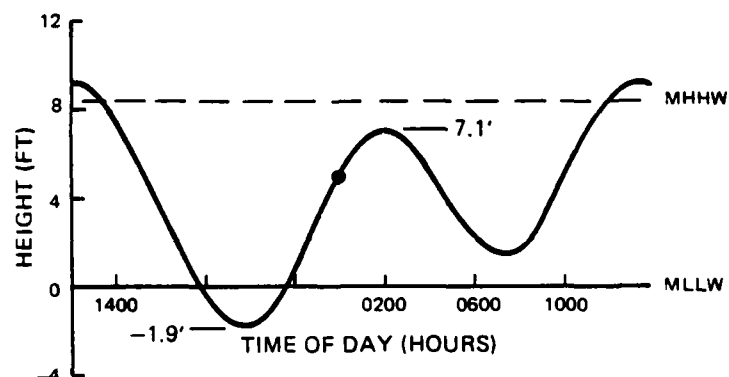
RIVER DISCHARGE = 195,000 CFS



VOYAGE NO. 17

TIDE HYDROGRAPH FOR
29 - 30 DECEMBER 1978

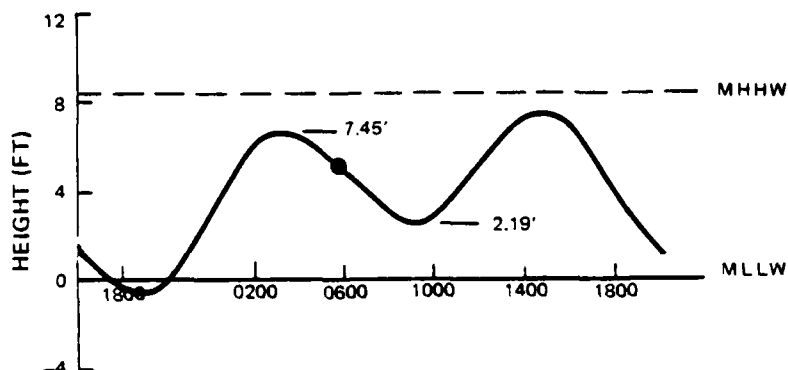
RIVER DISCHARGE = 217,000 CFS



VOYAGE NO. 18

TIDE HYDROGRAPH FOR
15 - 16 JAN 1979

RIVER DISCHARGE = 195,000 CFS

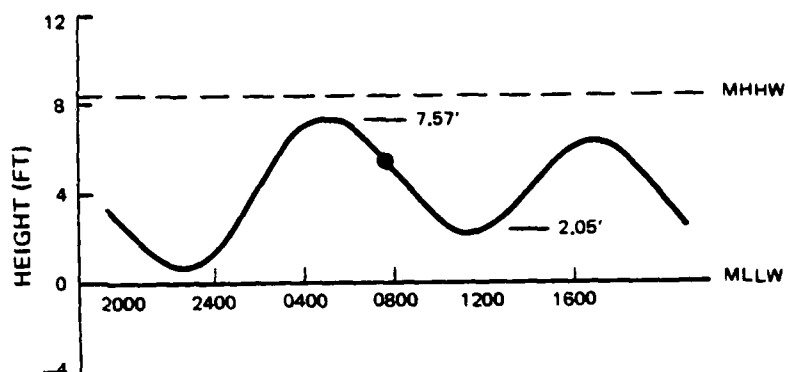


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 19

TIDE HYDROGRAPH FOR
18 - 19 JAN. 1979

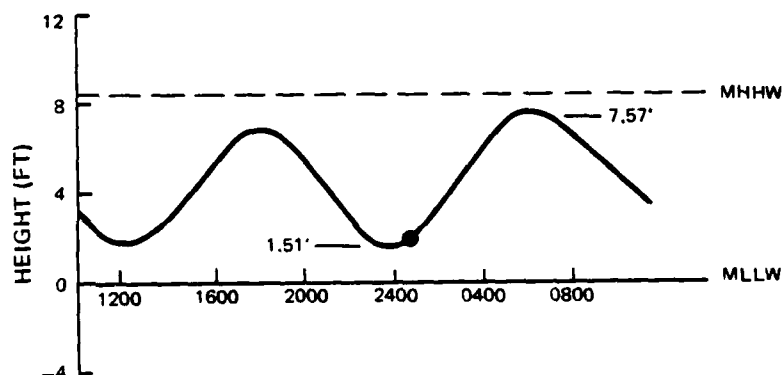
RIVER DISCHARGE = 166,000 CFS



VOYAGE NO. 20

TIDE HYDROGRAPH FOR
20 - 21 JAN. 1979

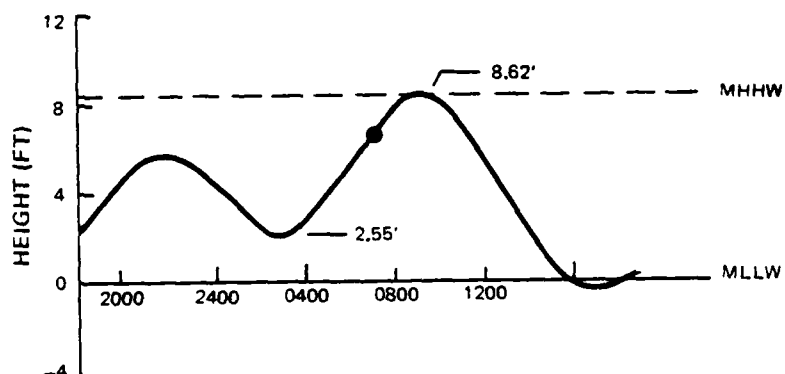
RIVER DISCHARGE = 123,000 CFS



VOYAGE NO. 21

TIDE HYDROGRAPH FOR
23 - 24 JAN. 1979

RIVER DISCHARGE = 201,000 CFS

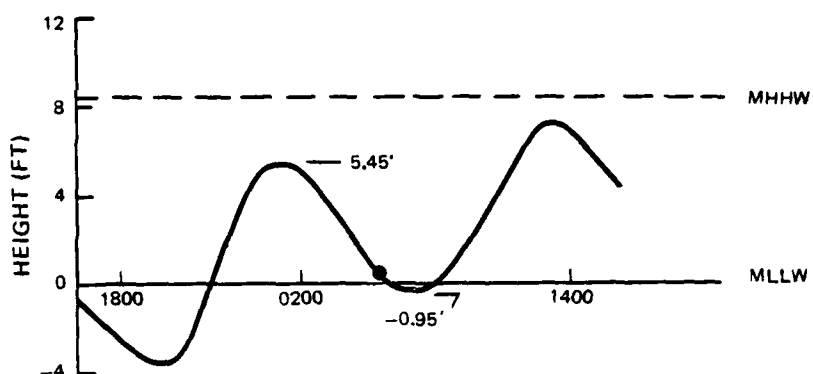


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 22

TIDE HYDROGRAPH FOR
27 - 28 JAN. 1979

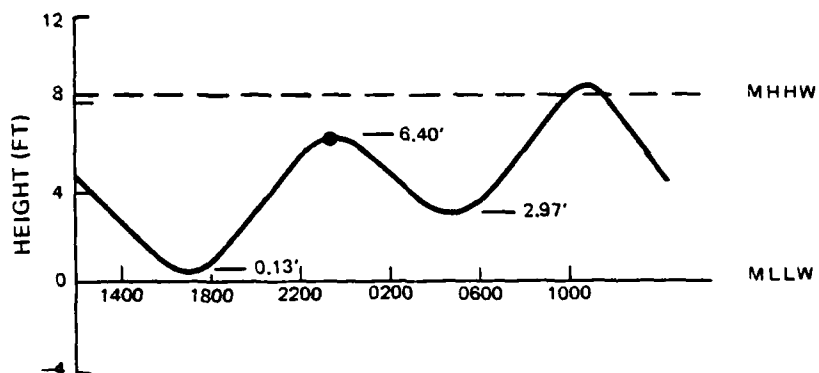
RIVER DISCHARGE = 155,000 CFS



VOYAGE NO. 23

TIDE HYDROGRAPH FOR
07 - 08 FEB. 1979

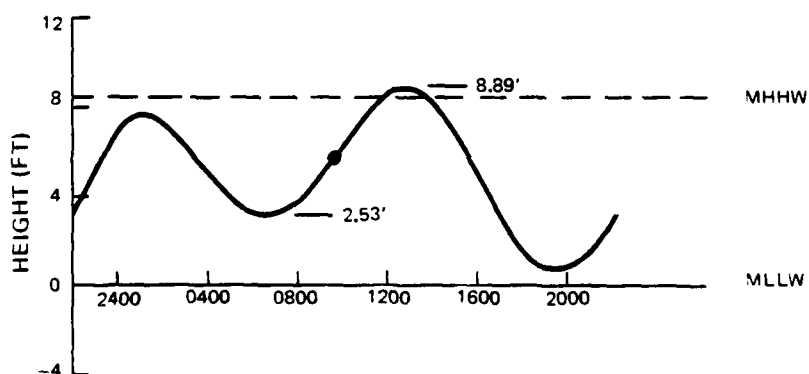
RIVER DISCHARGE = 212,000 CFS



VOYAGE NO. 24

TIDE HYDROGRAPH FOR
10 - 11 FEB. 1979

RIVER DISCHARGE = 277,000 CFS

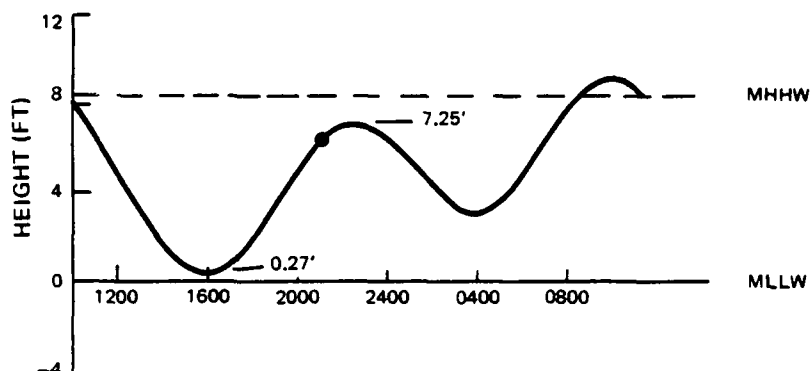


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 25

TIDE HYDROGRAPH FOR
22 - 23 FEB. 1979

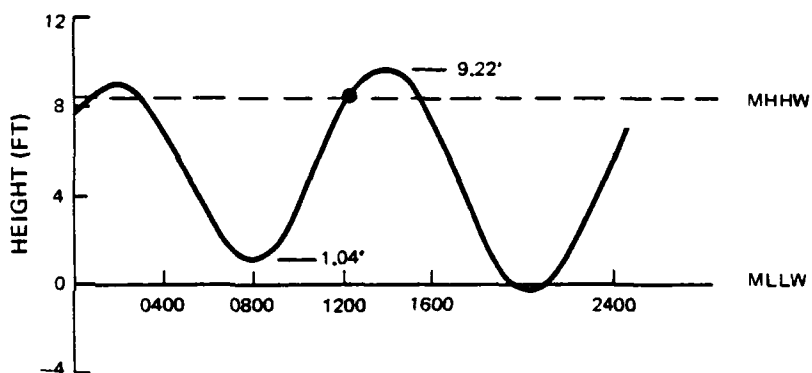
RIVER DISCHARGE - 202,000 CFS



VOYAGE NO. 26

TIDE HYDROGRAPH FOR
27 FEB. 1979

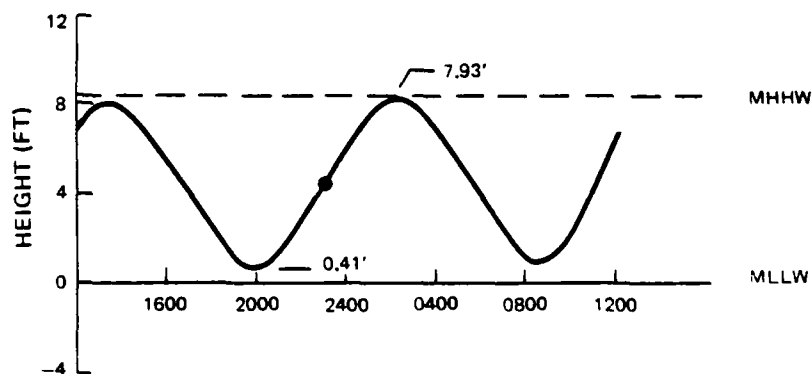
RIVER DISCHARGE = 242,000 CFS



VOYAGE NO. 27

TIDE HYDROGRAPH FOR
14 - 15 MAR. 1979

RIVER DISCHARGE = 211,000 CFS

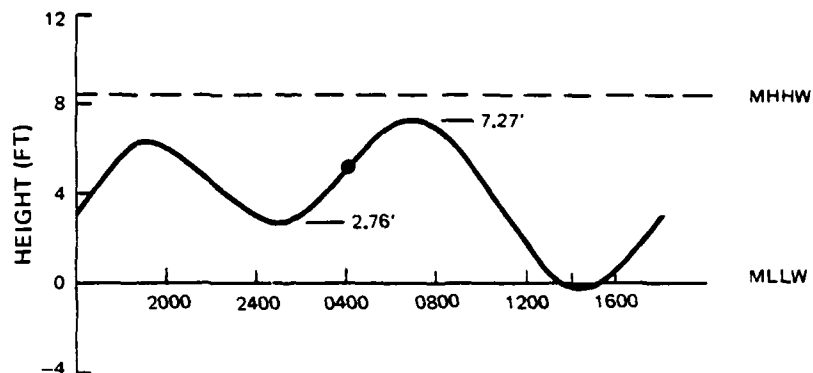


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 28

TIDE HYDROGRAPH FOR
21 - 22 MAR. 1979

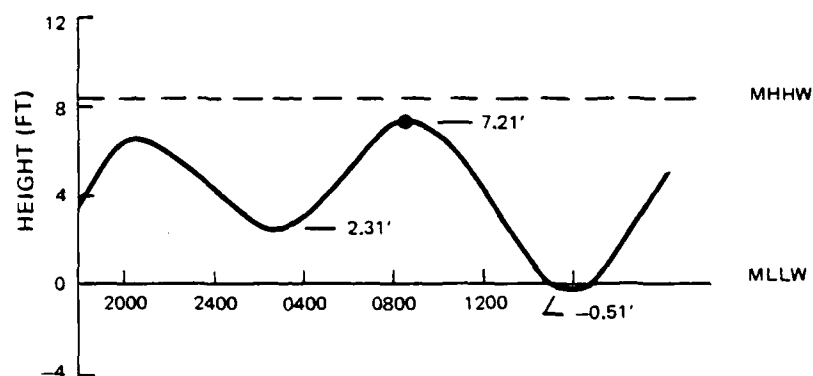
RIVER DISCHARGE $\approx$ 179,000 CFS



VOYAGE NO. 29

TIDE HYDROGRAPH FOR
22 - 23 MAR. 1979

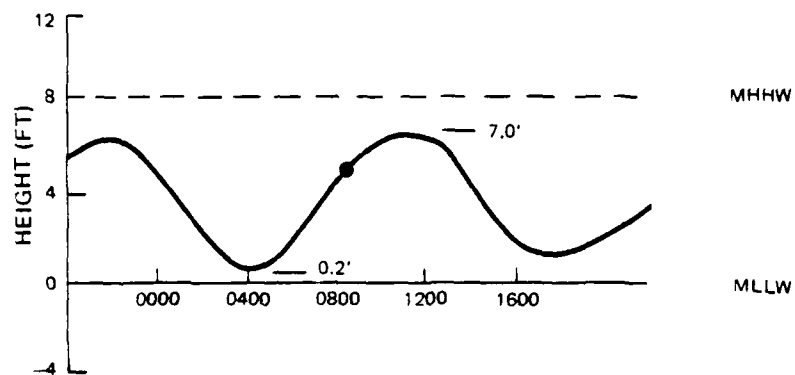
RIVER DISCHARGE $\approx$ 184,000 CFS



VOYAGE NO. 30

TIDE HYDROGRAPH FOR
15 - 16 OCTOBER, 1979

RIVER DISCHARGE $\approx$ 113,000 CFS



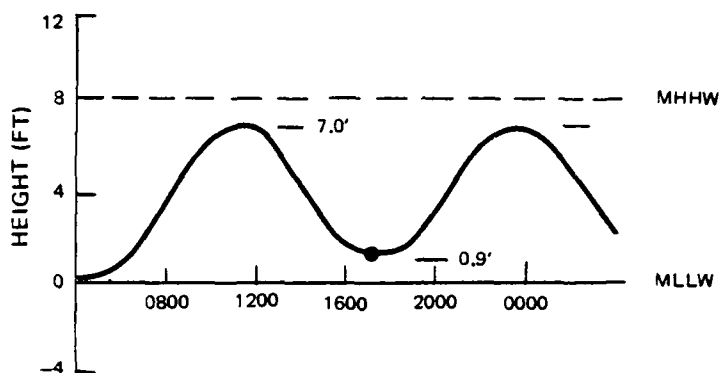
TIME OF DAY (HOURS)

● INDICATES APPROXIMATE MID-POINT BAR CROSSING

VOYAGE NO. 31

TIDE HYDROGRAPH FOR
17 - 18 OCTOBER, 1979

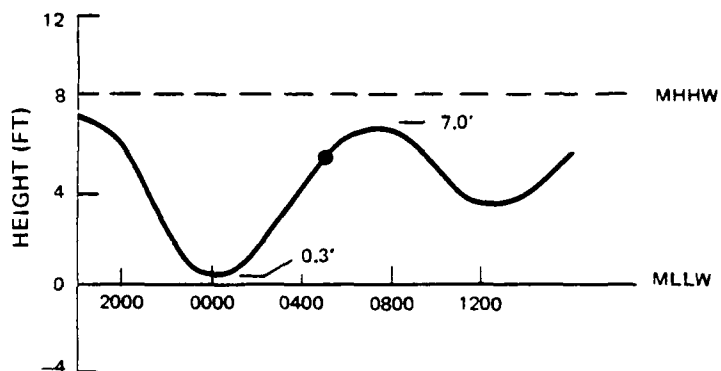
RIVER DISCHARGE = 111,000 CFS



VOYAGE NO. 32

TIDE HYDROGRAPH FOR
27 - 28 OCTOBER, 1979

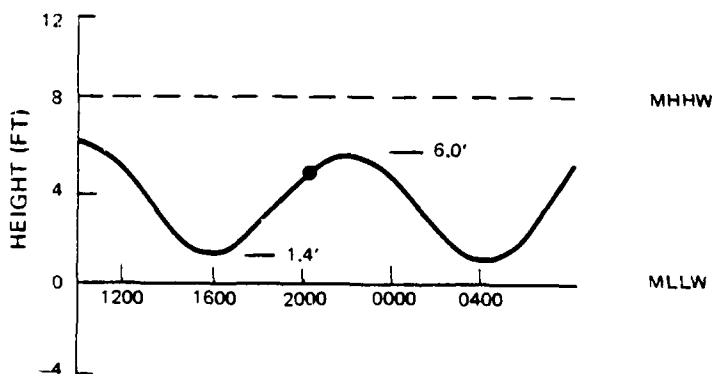
RIVER DISCHARGE = 121,000 CFS



VOYAGE NO. 33

TIDE HYDROGRAPH FOR
14 - 15 NOVEMBER, 1979

RIVER DISCHARGE = 108,000 CFS



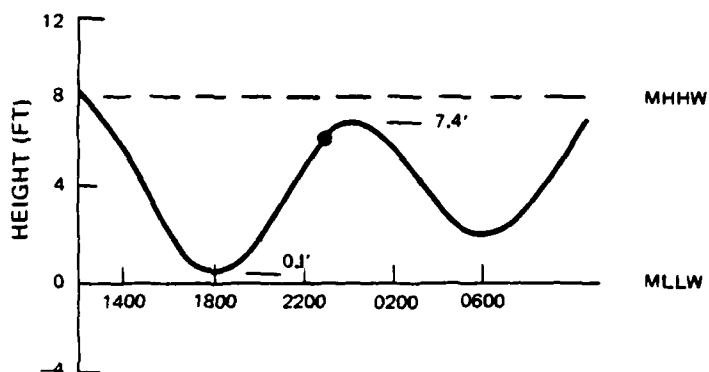
TIME OF DAY (HOURS)

● INDICATES APPROXIMATE MID-POINT BAR CROSSING

VOYAGE NO. 34

TIDE HYDROGRAPH FOR
17 - 18 NOVEMBER, 1979

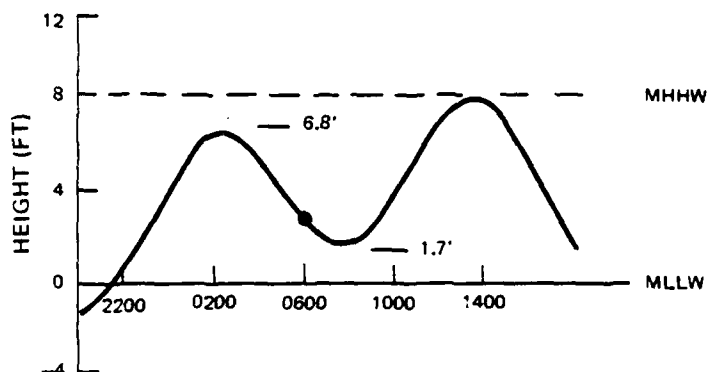
RIVER DISCHARGE = 155,000 CFS



VOYAGE NO. 35

TIDE HYDROGRAPH FOR
20 - 21 NOVEMBER, 1979

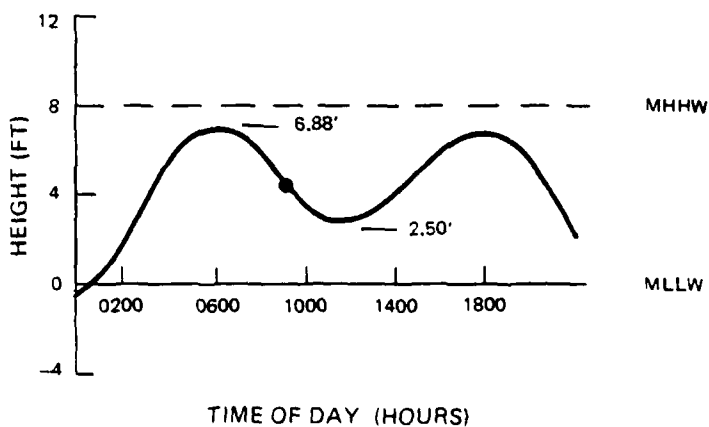
RIVER DISCHARGE = 155,000 CFS



VOYAGE NO. 36

TIDE HYDROGRAPH FOR
26 NOVEMBER, 1979

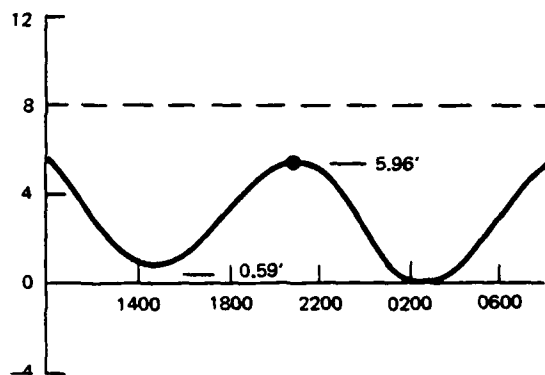
RIVER DISCHARGE = 164,000 CFS



● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

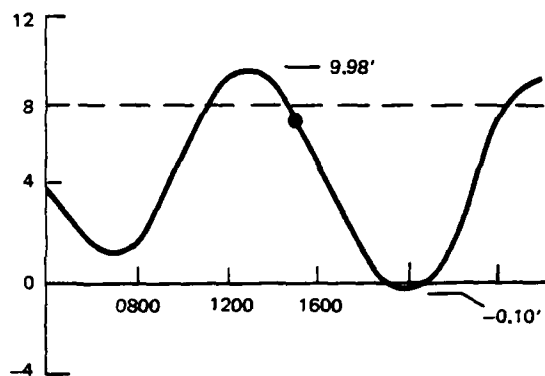
VOYAGE NO. 37

TIDE HYDROGRAPH FOR
28 - 29 NOVEMBER, 1979
RIVER DISCHARGE = 174,000 CFS



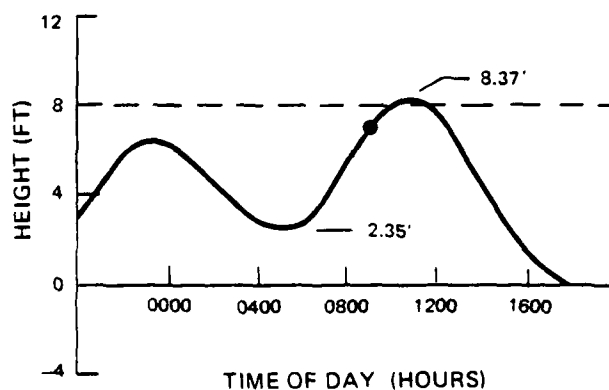
VOYAGE NO. 38

TIDE HYDROGRAPH FOR
3 - 4 DECEMBER, 1979
RIVER DISCHARGE = 225,000 CFS



VOYAGE NO. 39

TIDE HYDROGRAPH FOR
15 - 16 DECEMBER, 1979
RIVER DISCHARGE = 169,000 CFS

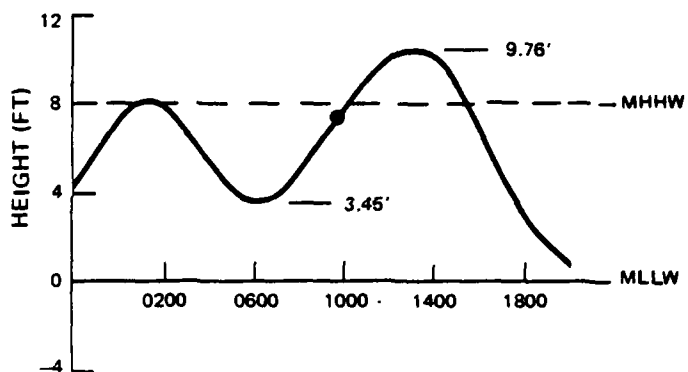


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 40

TIDE HYDROGRAPH FOR
17 - 18 DECEMBER, 1979

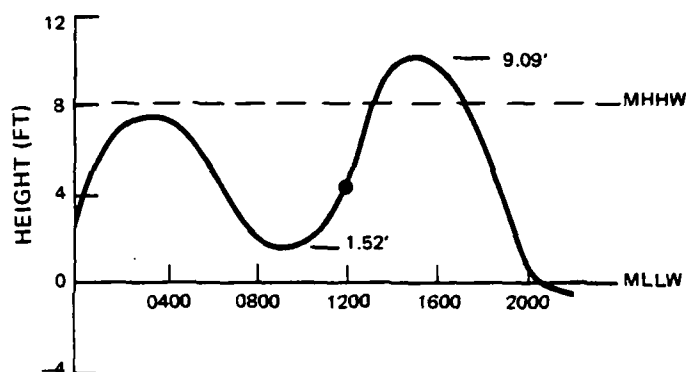
RIVER DISCHARGE = 203,000 CFS



VOYAGE NO. 41

TIDE HYDROGRAPH FOR
20 JANUARY, 1980

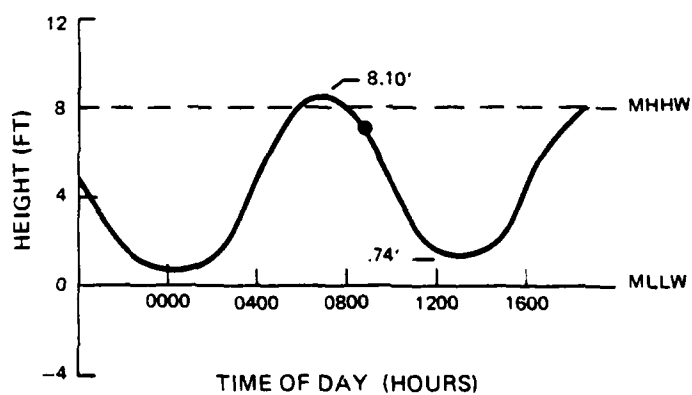
RIVER DISCHARGE = 279,000 CFS



VOYAGE NO. 42

TIDE HYDROGRAPH FOR
23 - 24 JANUARY, 1980

RIVER DISCHARGE = 206,000 CFS

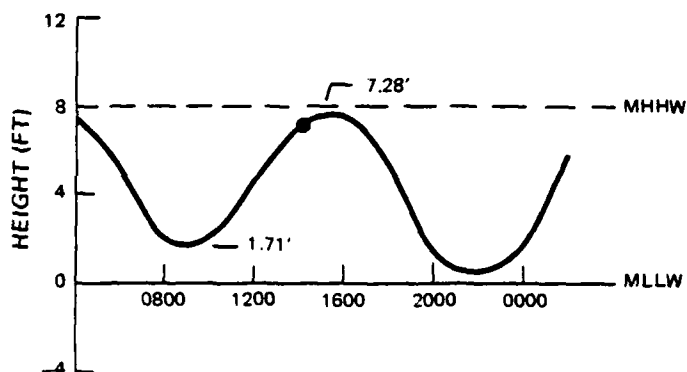


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 43

TIDE HYDROGRAPH FOR
4 - 5 FEBRUARY, 1980

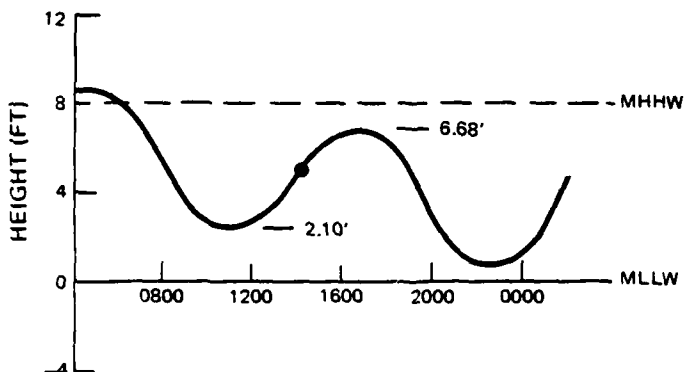
RIVER DISCHARGE = 201,000 CFS



VOYAGE NO. 44

TIDE HYDROGRAPH FOR
6 - 7 FEBRUARY, 1980

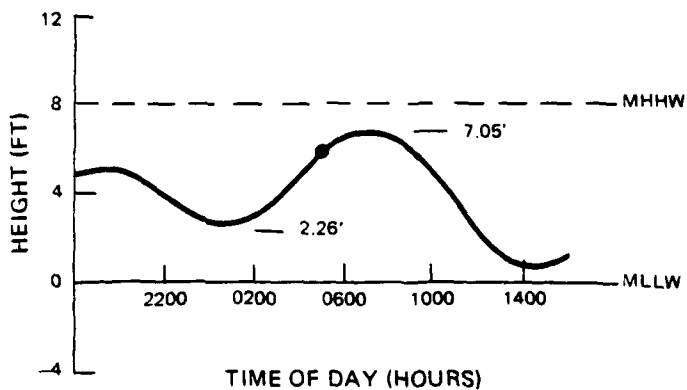
RIVER DISCHARGE = 166,000 CFS



VOYAGE NO. 45

TIDE HYDROGRAPH FOR
09 - 10 FEBRUARY, 1980

RIVER DISCHARGE = 139,000 CFS

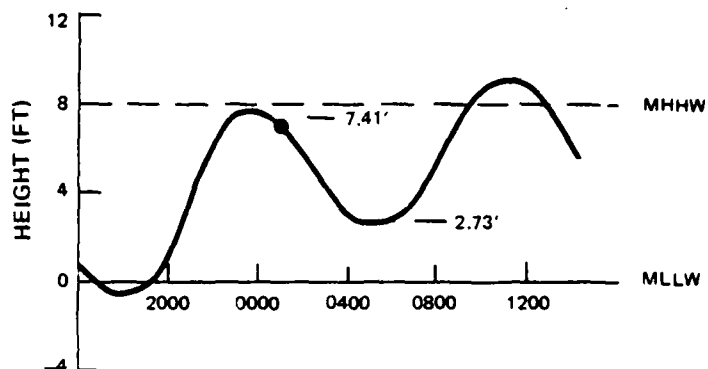


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 46

TIDE HYDROGRAPH FOR
13 - 14 FEBRUARY, 1980

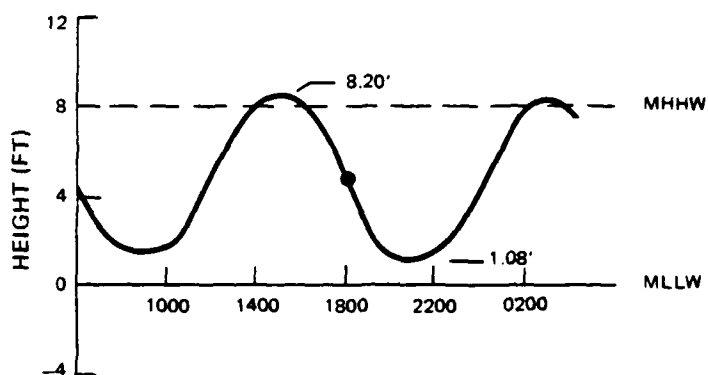
RIVER DISCHARGE = 203,000 CFS



VOYAGE NO. 47

TIDE HYDROGRAPH FOR
4 - 5 MARCH, 1980

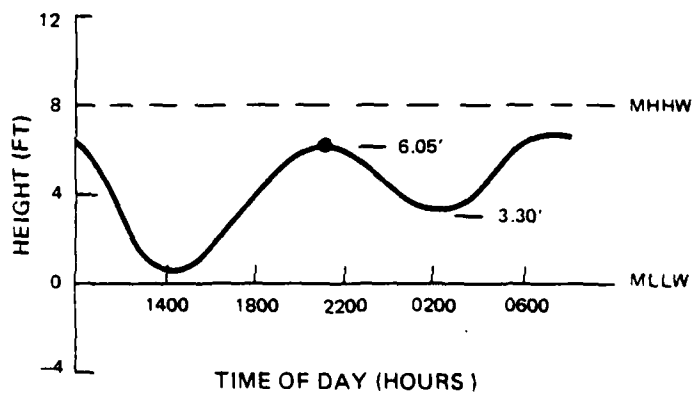
RIVER DISCHARGE = 201,000 CFS



VOYAGE NO. 48

TIDE HYDROGRAPH FOR
10 - 11 MARCH, 1980

RIVER DISCHARGE = 128,000 CFS

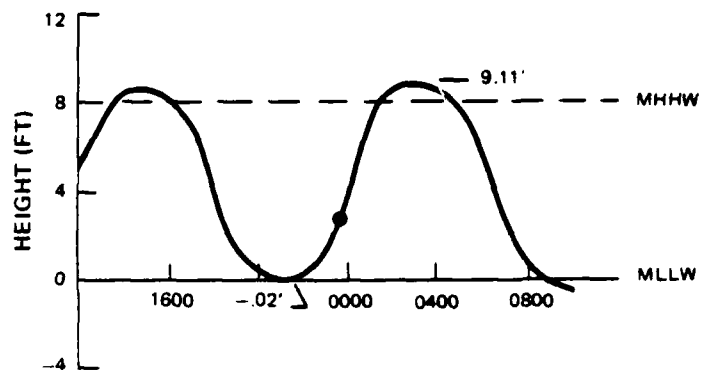


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 49

TIDE HYDROGRAPH FOR
18 - 19 MARCH, 1980

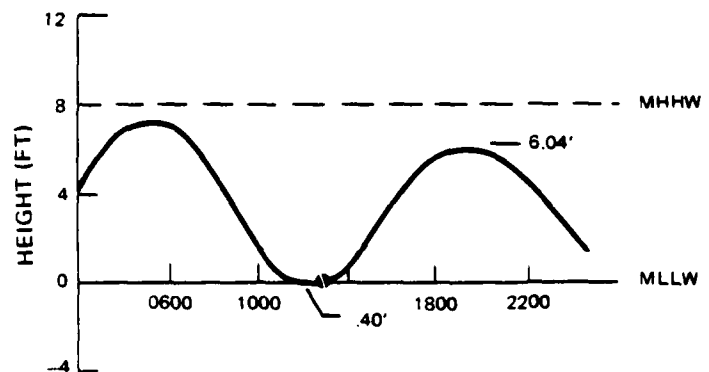
RIVER DISCHARGE = 255,000 CFS



VOYAGE NO. 50

TIDE HYDROGRAPH FOR
22 MARCH, 1980

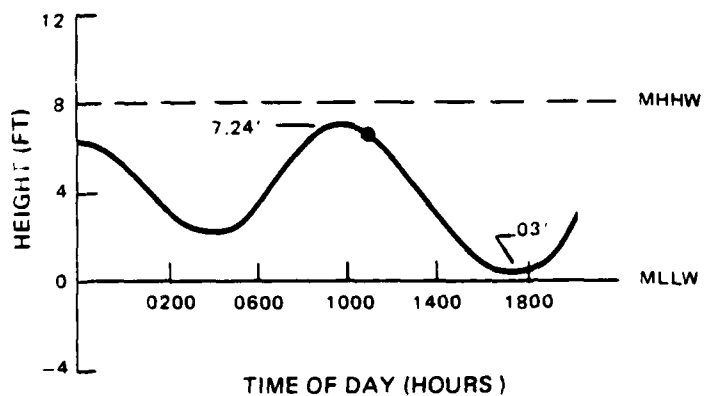
RIVER DISCHARGE = 1640,000



VOYAGE NO. 51

TIDE HYDROGRAPH FOR
25 - 26 MARCH, 1980

RIVER DISCHARGE = 128,000 CFS

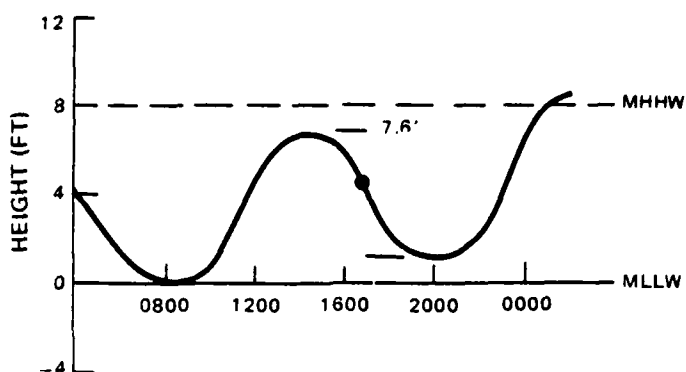


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

VOYAGE NO. 52

TIDE HYDROGRAPH FOR
1 - 2 APRIL, 1980

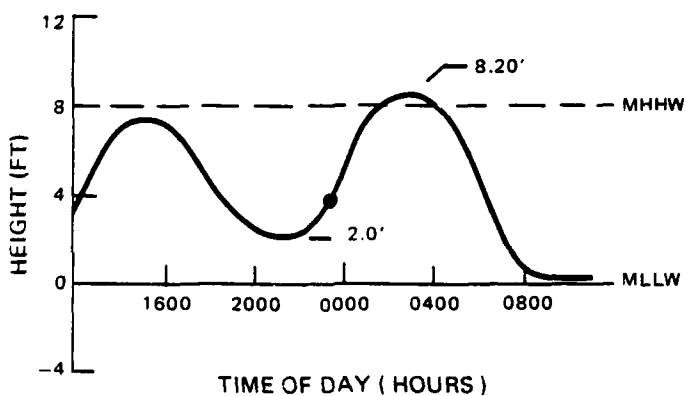
RIVER DISCHARGE = 171,000 CFS



VOYAGE NO. 53

TIDE HYDROGRAPH FOR
3 - 4 APRIL, 1980

RIVER DISCHARGE = 179,000



● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

APPENDIX I
ENCOUNTER PERIODS BASED ON OBSERVED WAVE DATA

ENCOUNTER PERIOD BASED ON OBSERVED WAVE DATA[†]
(Phase I)

VOYAGE NUMBER	SHIP SPEED (Kts)	SHIP'S COURSE MADE GOOD (Deg)	OBSERVED SWELL DIRECTION (Deg)	ANGLE OF INCIDENCE β (Deg)	OBSERVED SWELL PERIOD (Sec)	ENCOUNTER PERIOD (Sec)
1	10	44.5	315	90.5	8	8.0
2	12.5	44.1	270	45.9	8	12.5
3 ^Δ	13	--	270	--	9	--
4	14	43.7	247.5	23.8	9	17.0
5	13	46.2	292.5	66.3	8	10.2
6	14	48.0	315	87.0	8	8.3
7	14	221.6	292.5	109.1	7	5.8
8 ^Δ	11	--	315	--	11	--
9	13.5	222.9	292.5	110.4	10	8.7
10	13	42.4	315	92.6	8	7.8
11	15	225.9	315	90.9	8	7.9
12	15	54.9	247.5	12.6	8	20.2
13 ^Δ	13	42.9	270	47.1	--	--
14 ^Δ	11.5	--	292.5	--	9	--
15	8	44.2	270	45.8	8	10.4
16	6	226.9	270	136.9	3	6.3
17 ^Δ	17	46.9	--	--	--	--
18	13	43.4	292.5	69.1	8	9.9
19	8	223.9	270	133.9	10-11	8.9
20	17	43.9	247.5	23.6	10-11	20.6
21	17	45.1	337.5 270	112.4 44.9	8-10 3	7.3 15.9
22	17	44.4	292.5	68.1	10	12.6
23	18.5	49.9	270	40.1	10	18.8
24	16	55.8	202.5	33.3	9	17.8
25 ^Δ	17	--	202.5	--	9	--
26	16	52.0	225 270	7.0 38.0	9 10	23.2 17.1
27	15	44.7	270	45.3	10	15.3
28	13	45.9	292.5	66.6	10	12.1
29 ^Δ	10.5	--	270	--	10	--

^Δ Data unavailable

$$P_e = \frac{T}{1 - \frac{V \cos \beta}{37}} (0.5921 V \cos \beta) \text{ where } P_e = \text{encounter period sec}$$

T = wave period sec
 V = ship's speed knots
 β = angle of incidence deg

ENCOUNTER PERIOD BASED ON OBSERVED WAVE DATA[†]
(Phase II)

VOYAGE NUMBER	SHIP SPEED (Kts)	SHIP'S COURSE MADE GOOD (Deg)	OBSERVED SWELL DIRECTION (Deg)	ANGLE OF INCIDENCE θ (Deg)	OBSERVED SWELL PERIOD (Sec)	ENCOUNTER PERIOD (Sec)
30	14	43.6	315	91.4	8	7.9
31	10	226.7	270	136.7	8	6.2
32	16	49.7	270	40.3	10	16.7
33	14	52.8	270	37.2	10	15.8
34	14	222.6	270	132.6	9	6.7
35	13	225	225	180	8-10	6.1
36	17	68.6	270	21.4	8	23.0
37	14	57.1	270	32.9	10	16.3
38	14	223.8	180	136.2	6-7	4.3
39	13	44.9	270	45.1	8	12.9
40	12	231.5	225	173.5	8	5.4
41 ¹	14	--	202.5	--	8-10	--
42	17	44.5	292.5	68	13	15.5
43	15	50.7	270	39.3	10	16.2
44	8	230.5	270	140.5	8	6.4
45 ¹	14	--	270	--	10	--
46	14	221.3	225	176.3	8-10	6.0
47	13	45.4	292.5	67.1	8-10	11.1
48	12	47.0	270	43	8-9	12.9
49 ¹	14	--	270	--	13	--
50	14	225.0	292.5	112.5	12-13	11.0
51	14	44.7	292.5	67.8	6-8	9.3
52	16	42.3	292.5	70.2	11	14.1
53	14	49.6	270	40.4	8-10	15.1

¹ Data unavailable

$P_e = \frac{T}{1 - \frac{V \cos \theta}{T}}$ 0.5921 V cos θ where P_e = encounter period sec

T = wave period sec

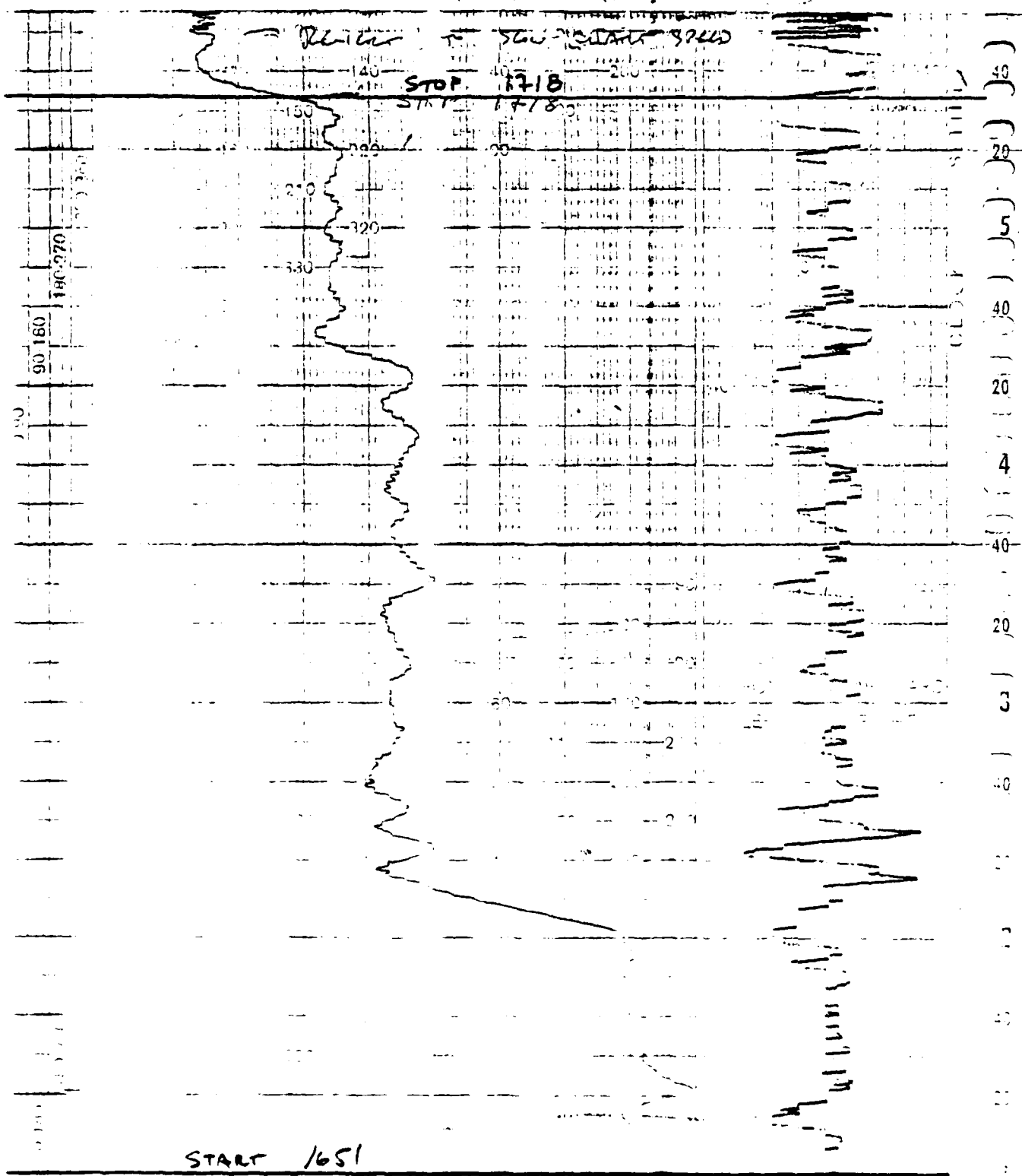
V = ship's speed knots

θ = angle of incidence deg

APPENDIX J
STRIP CHART RECORDINGS OF RUDDER DEFLECTIONS
FOR VOYAGE NOS. 30 AND 31

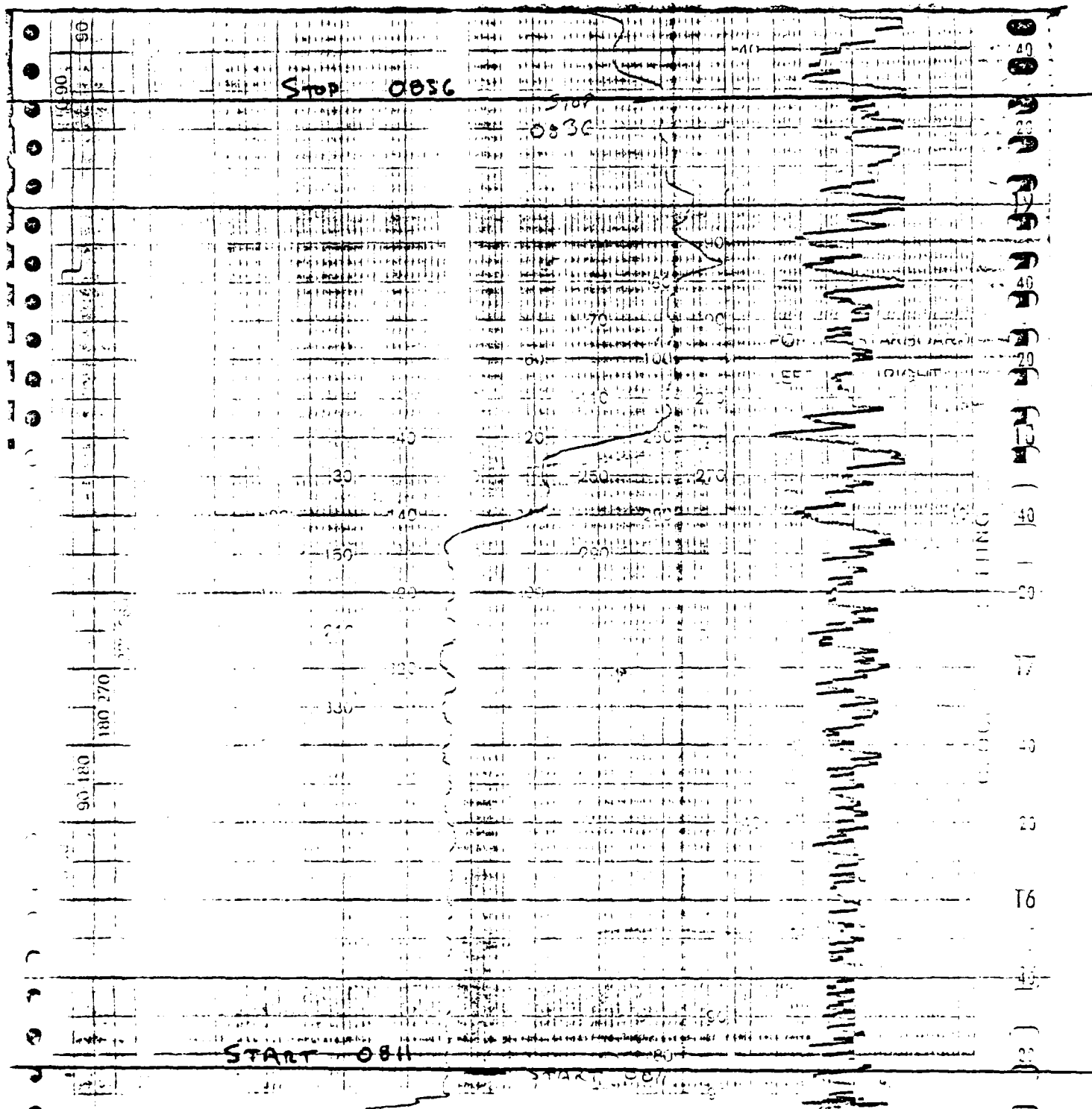
Rudder Angle & Course Record

VOLTAJE 31
PAGE 9/11

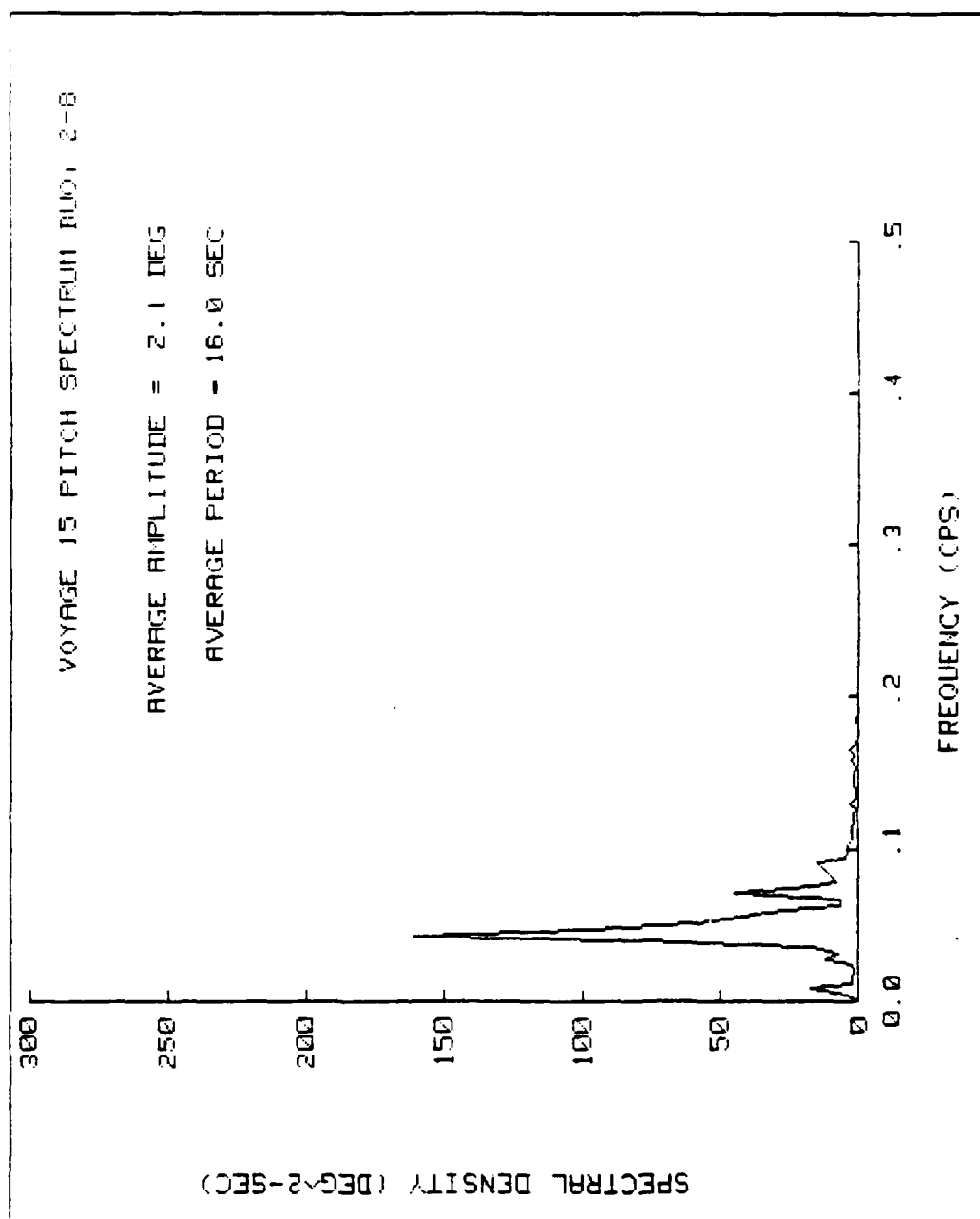


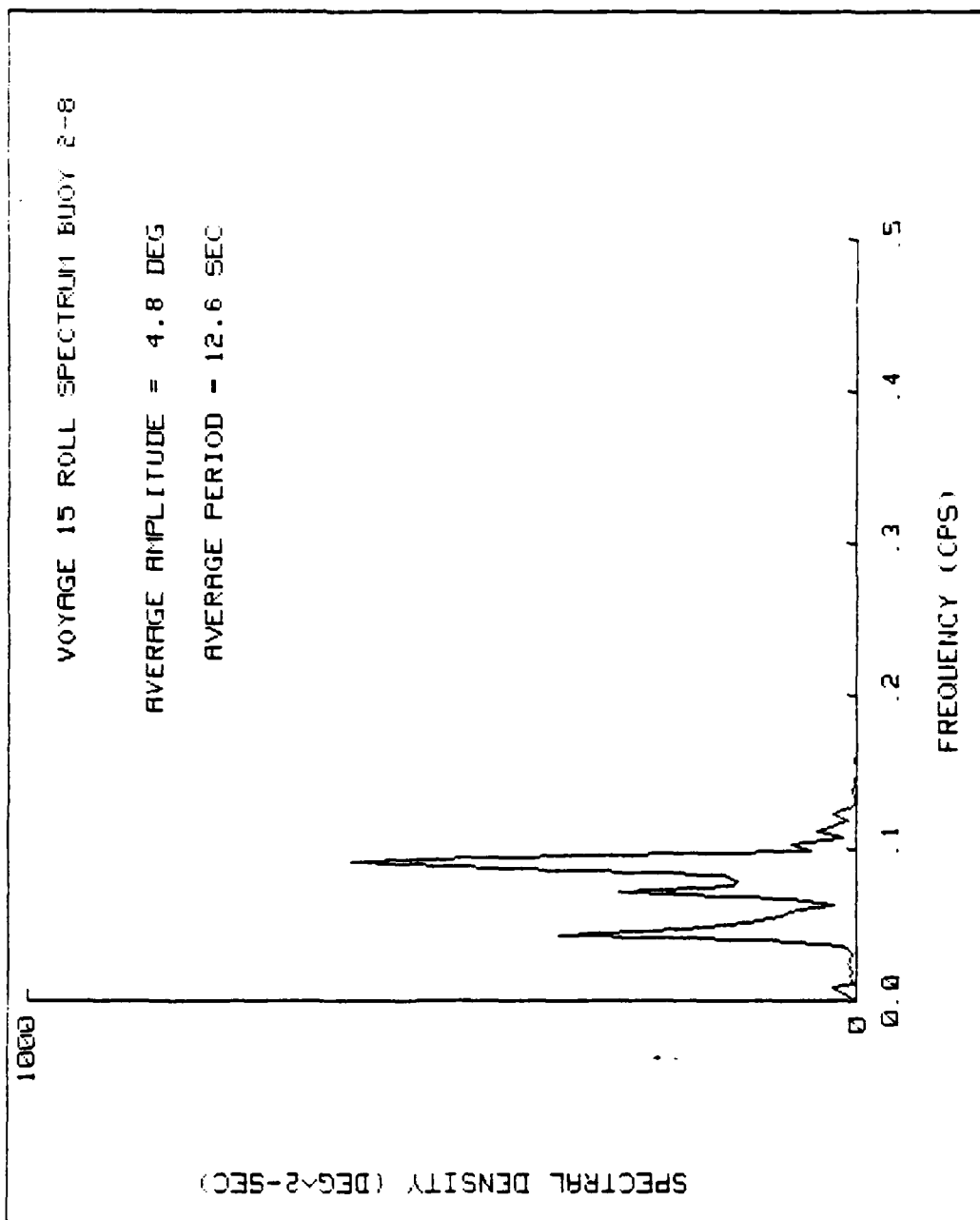
VOYAGE 30
PAGE 9/11

Rudder Angle & Course Record



APPENDIX K
PLOTS OF SHIP MOTION SPECTRA FOR SELECTED VOYAGES

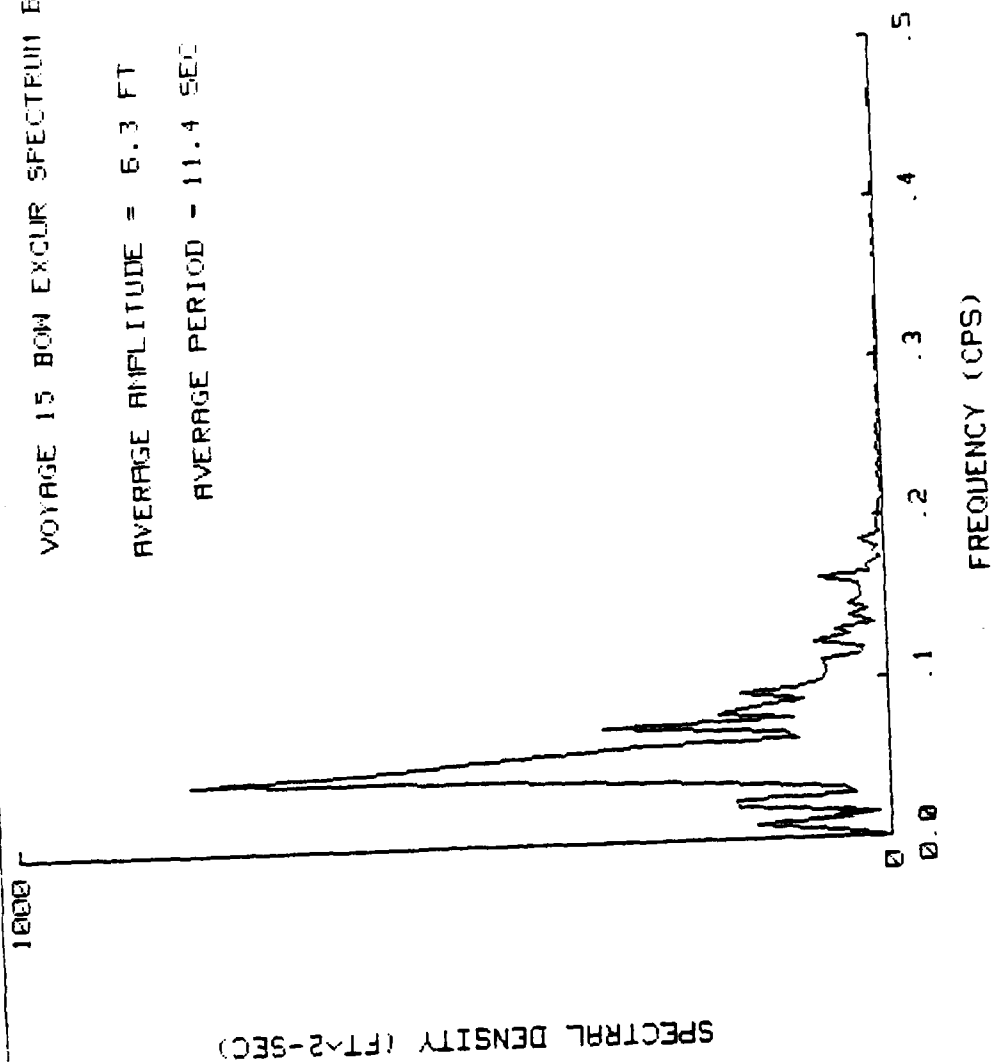


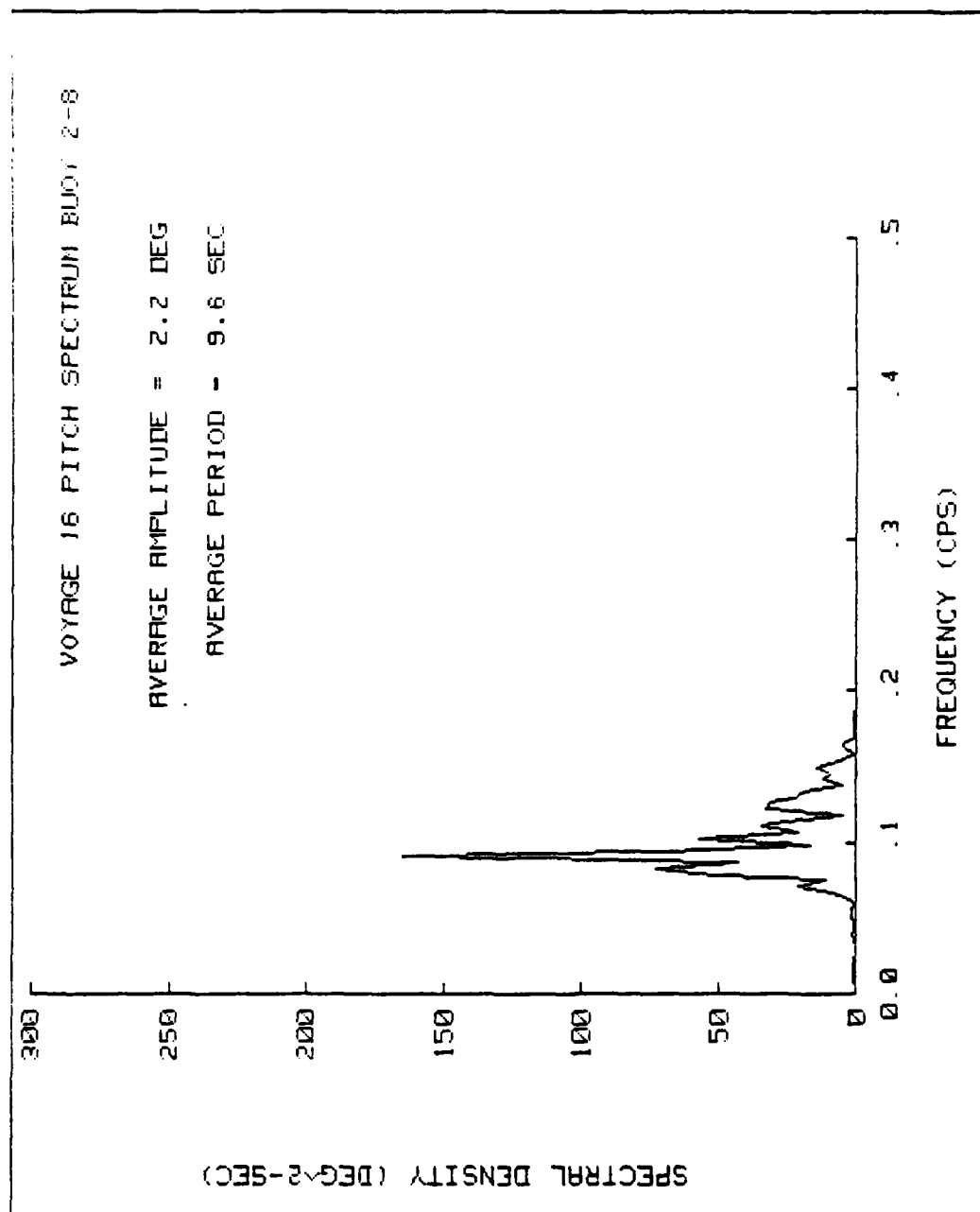


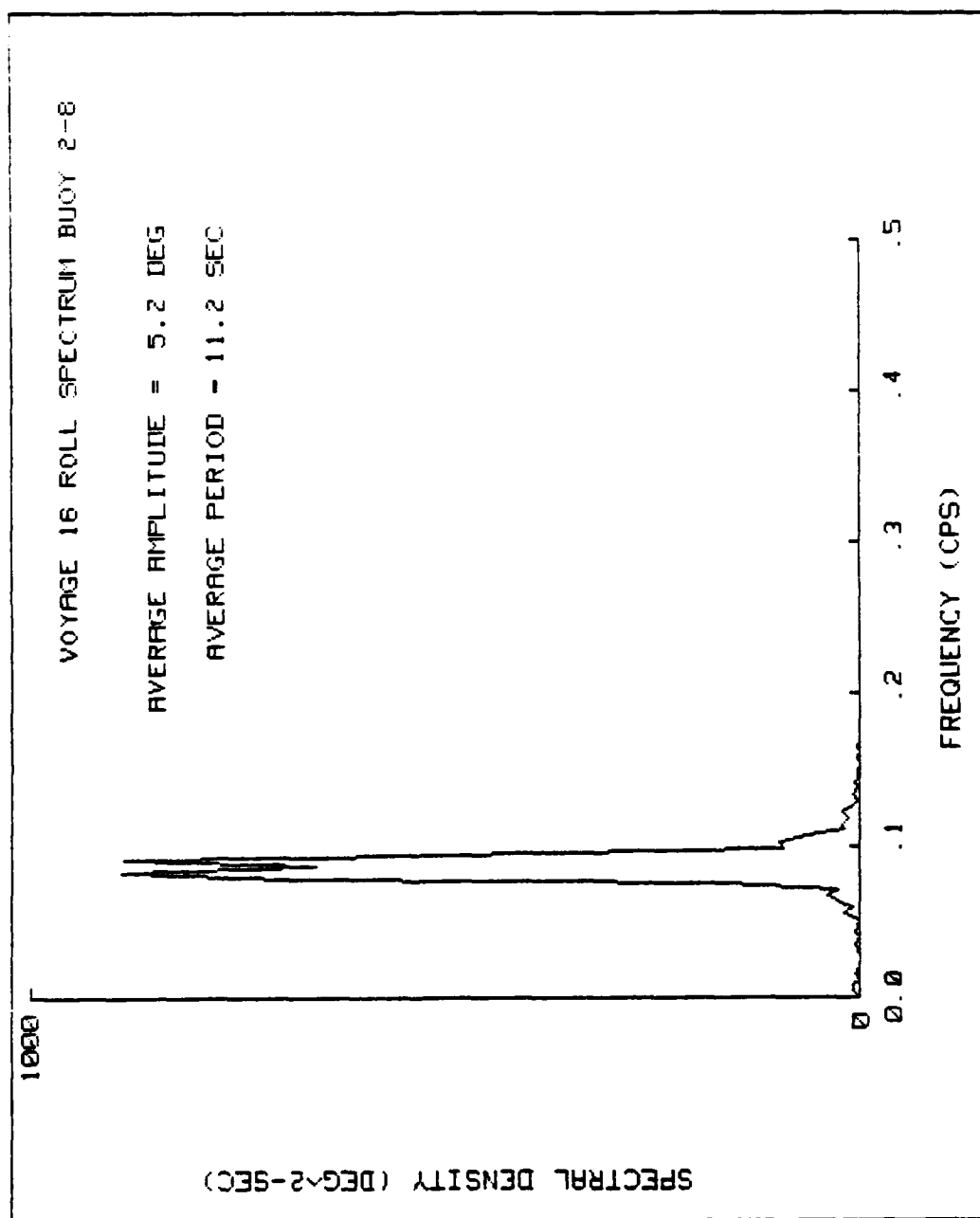
VOYAGE 15 BOW EXCUR SPECTRUM BUOY 2-8

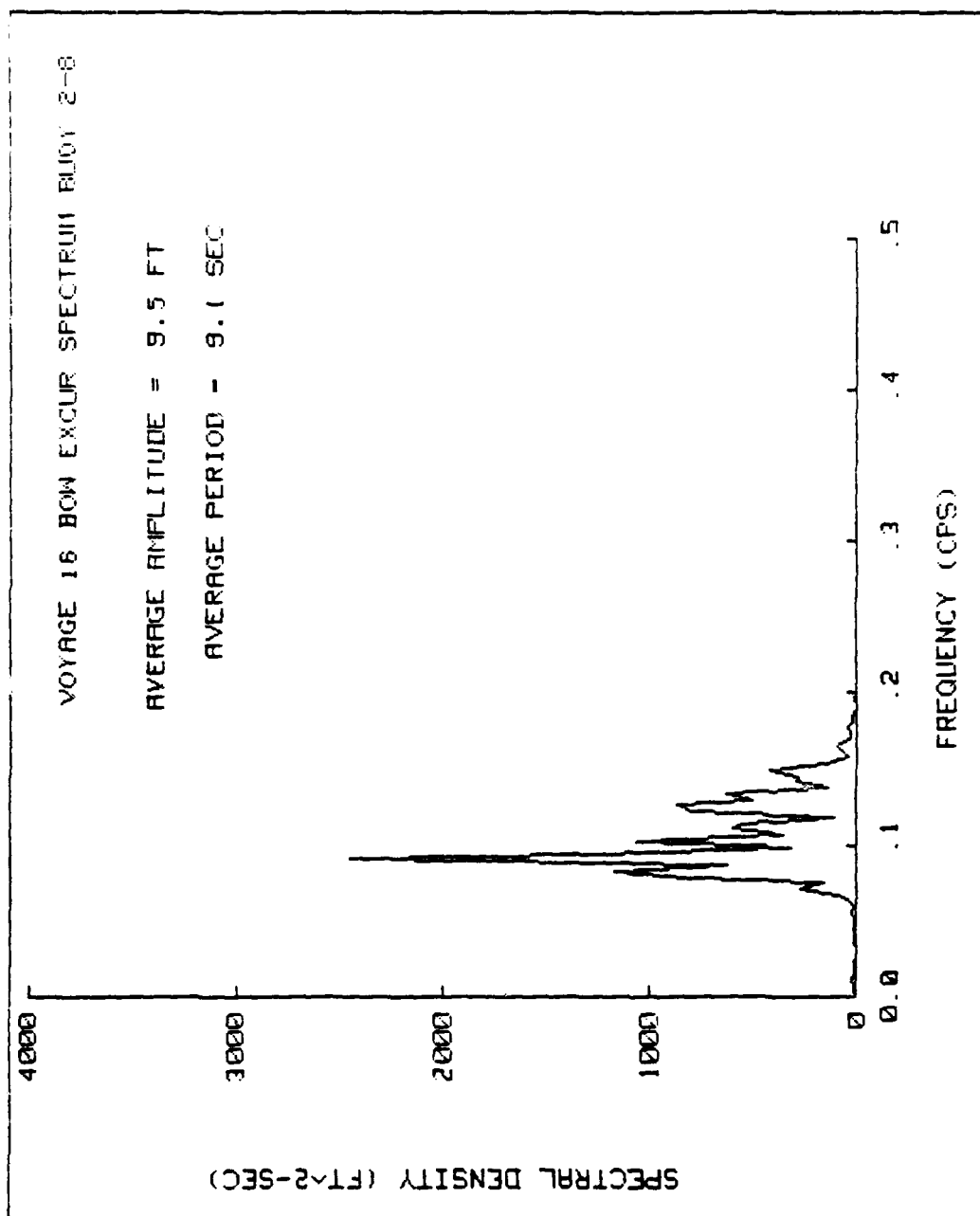
AVERAGE AMPLITUDE = 6.3 FT

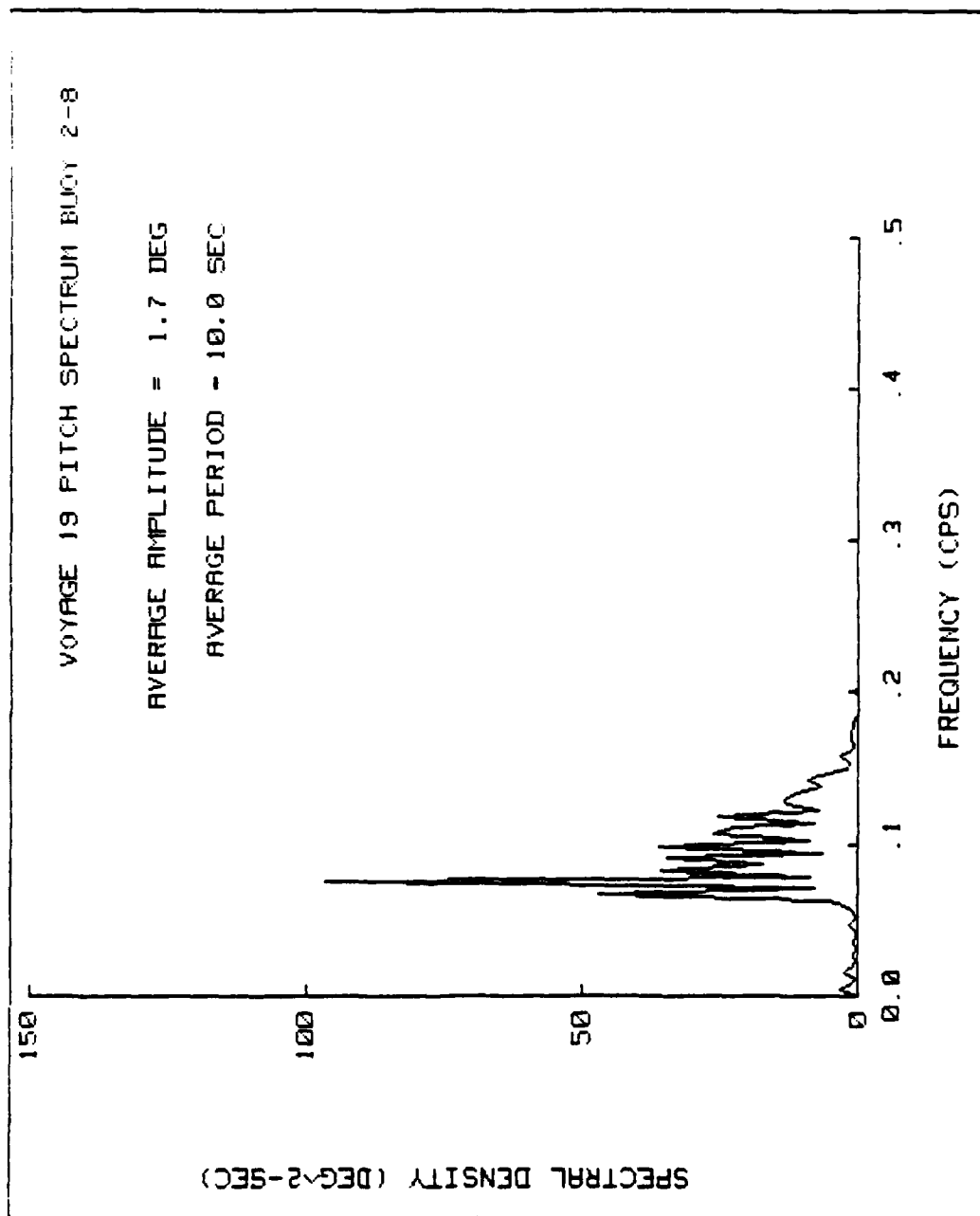
AVERAGE PERIOD = 11.4 SEC

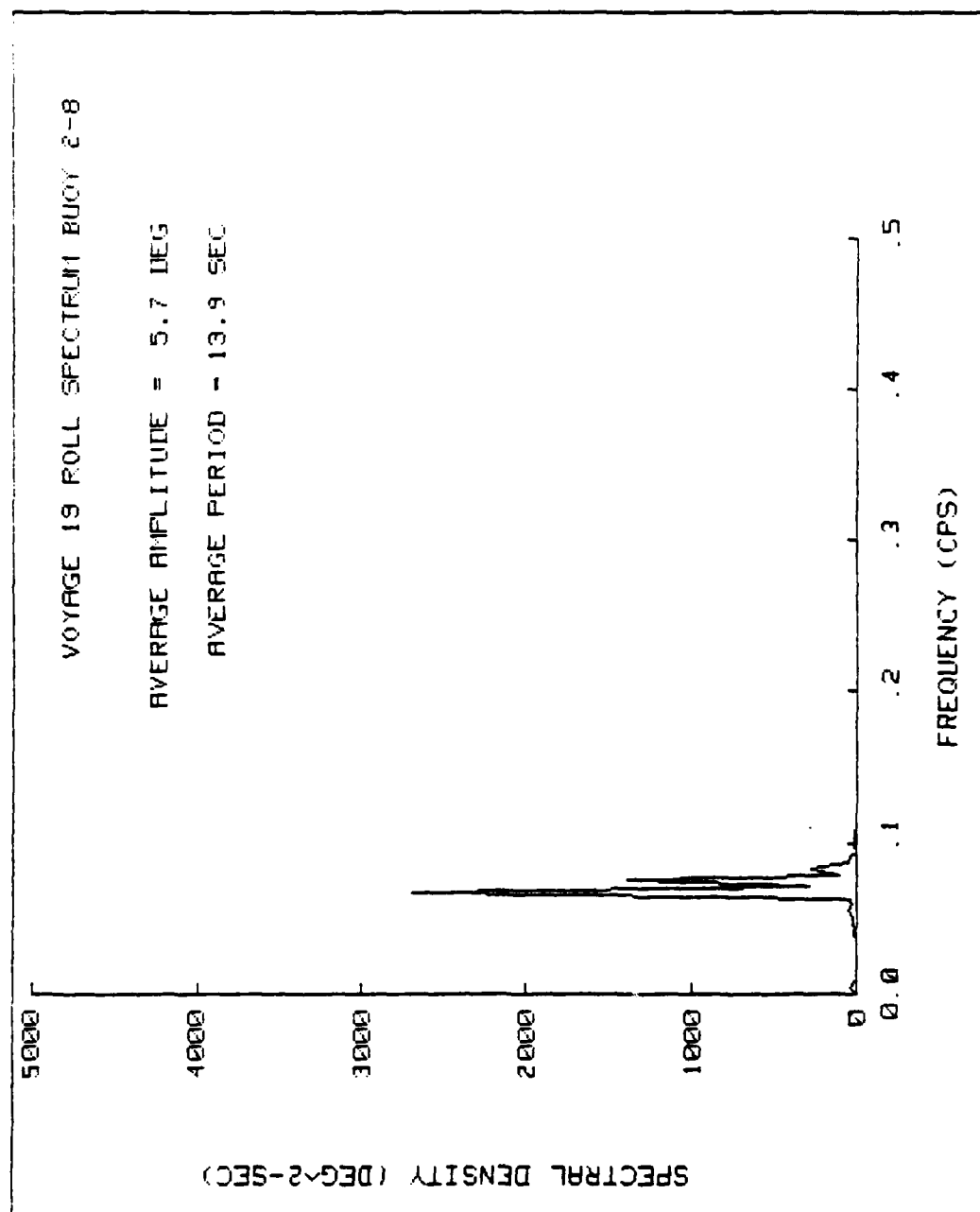


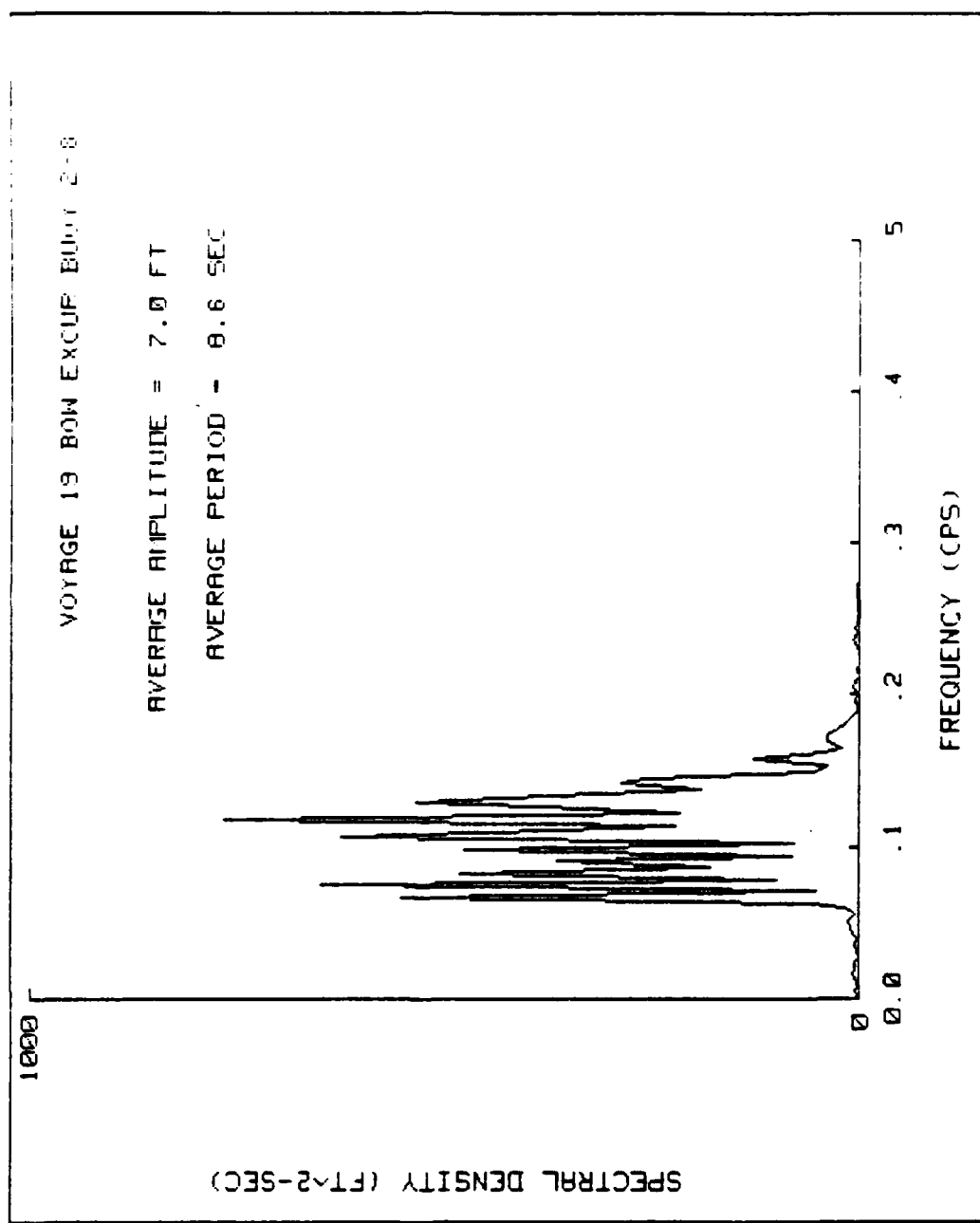


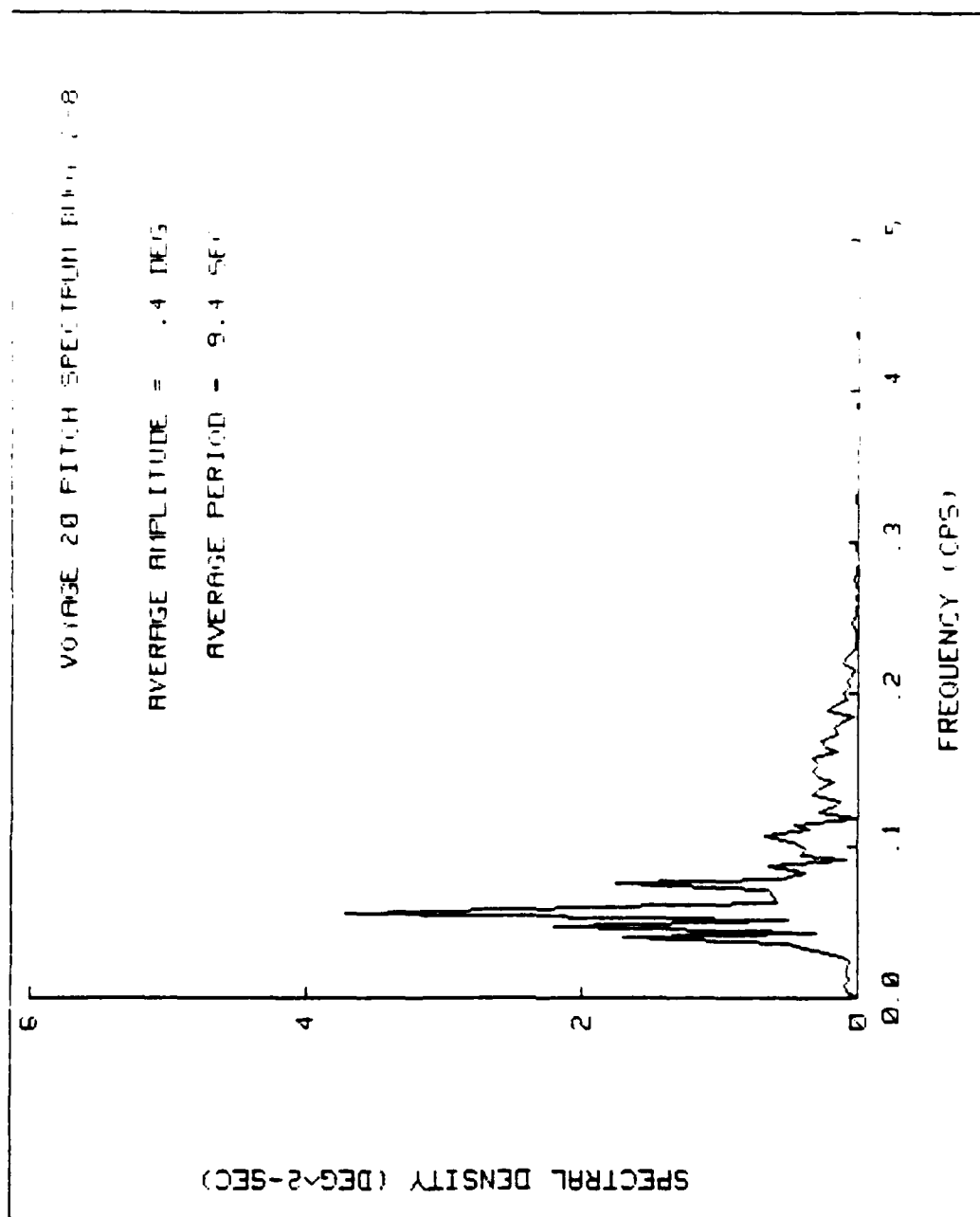


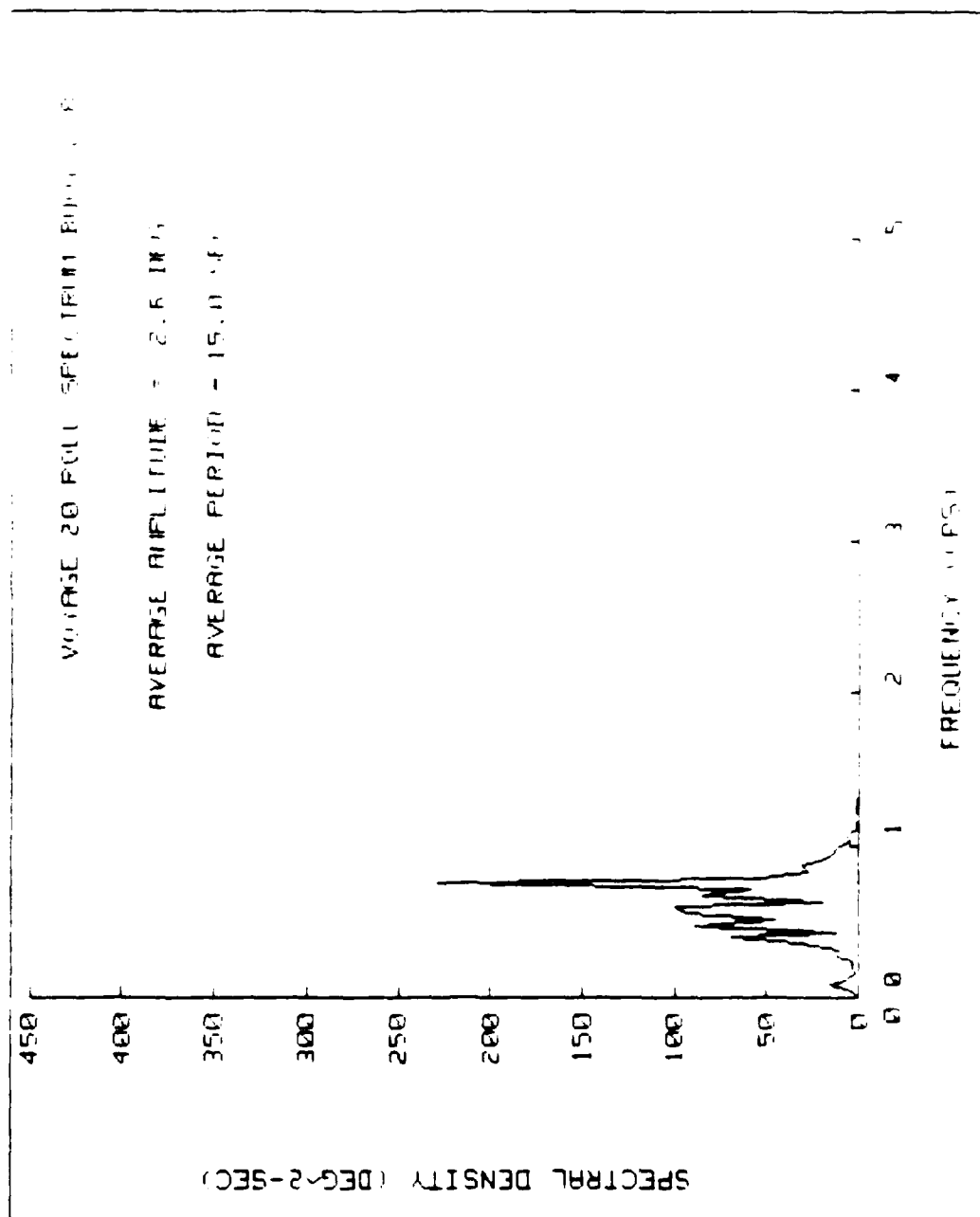


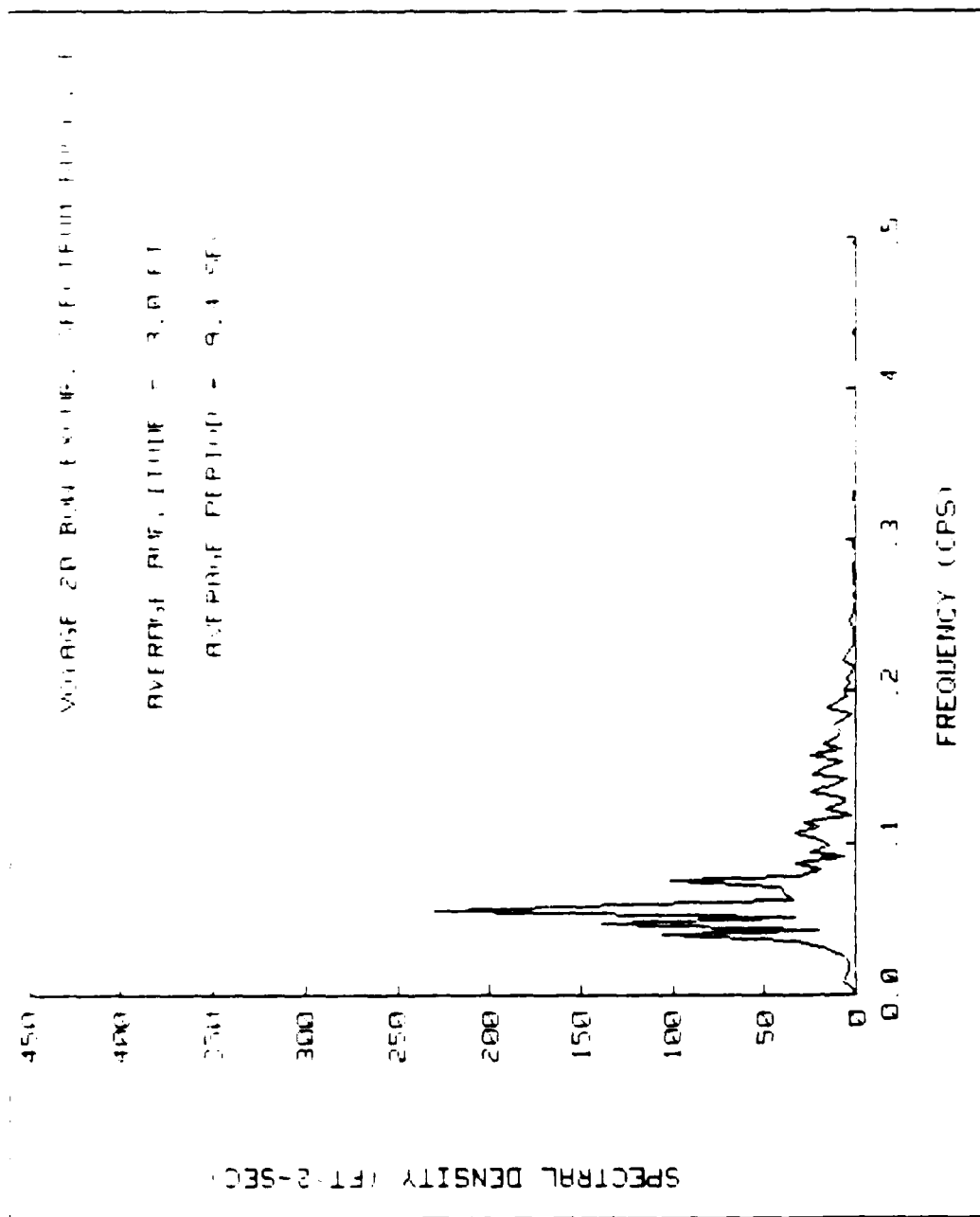








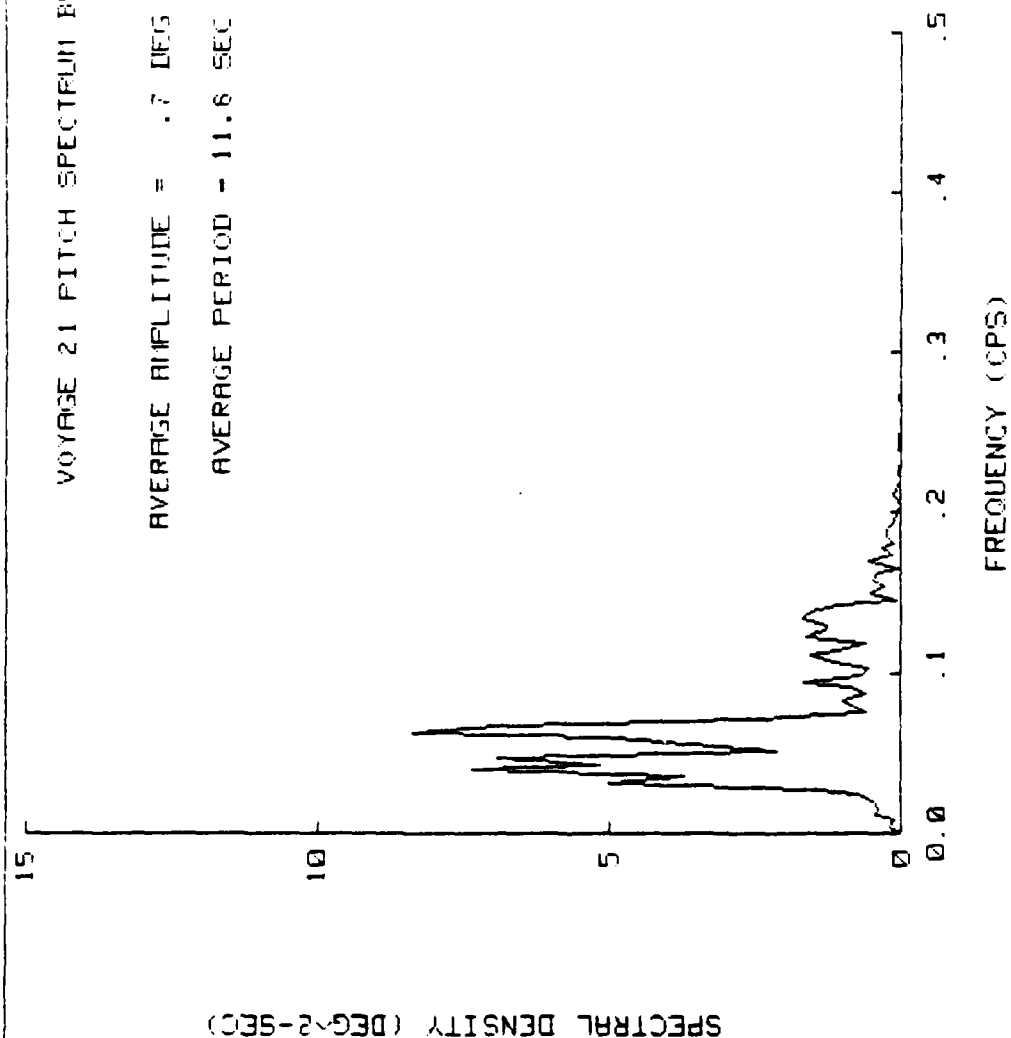


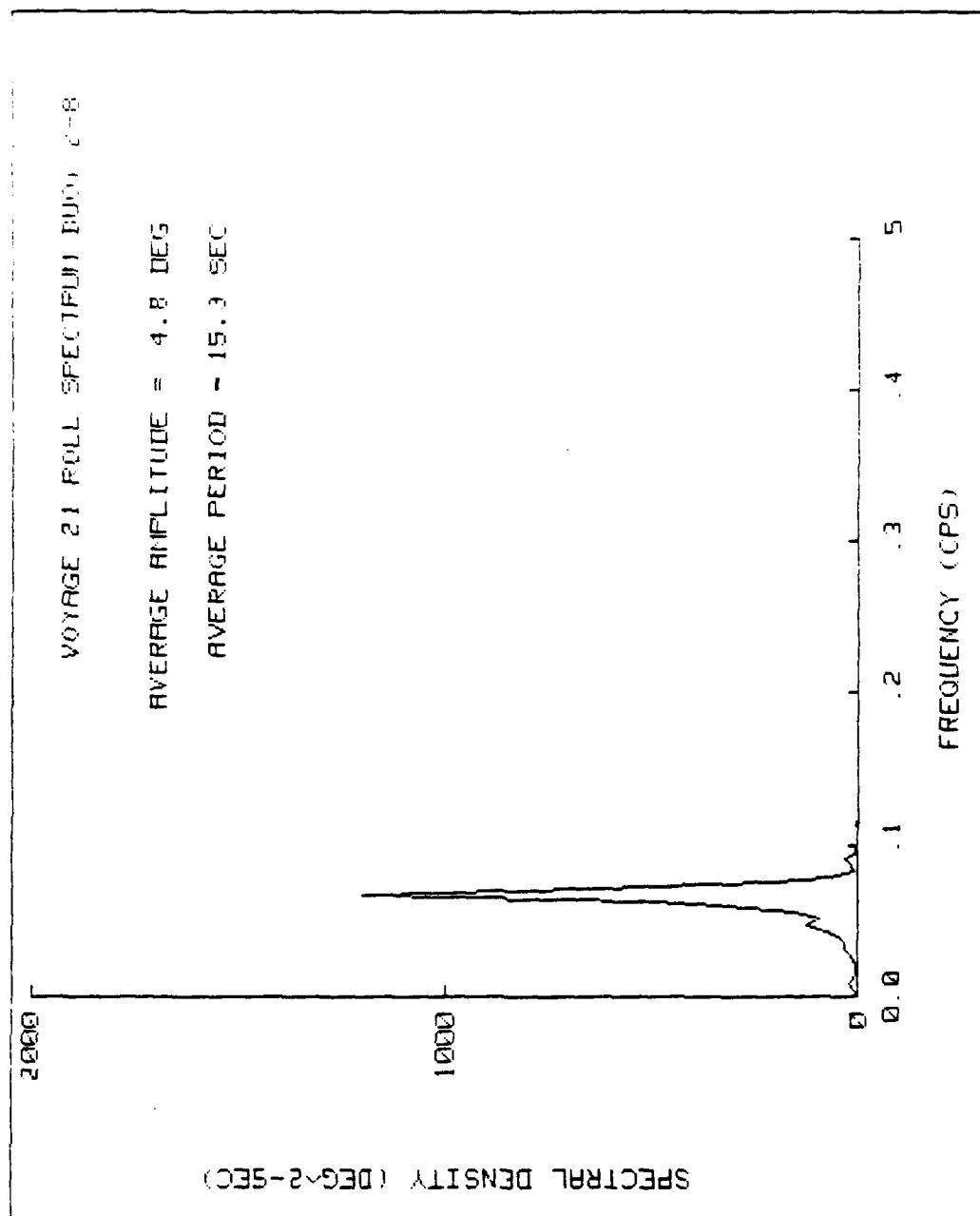


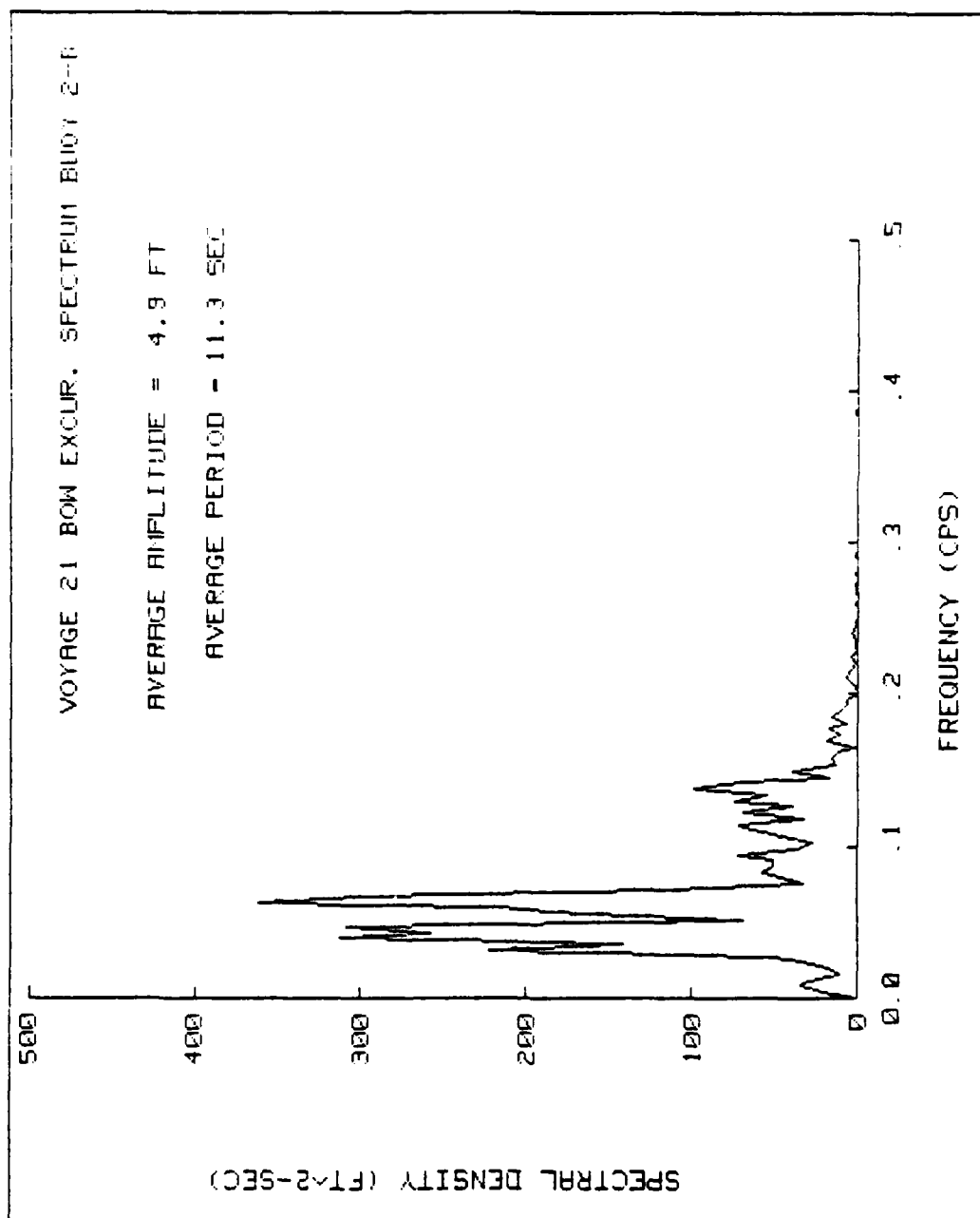
VOYAGE 21 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .7 DEG

AVERAGE PERIOD = 11.6 SEC



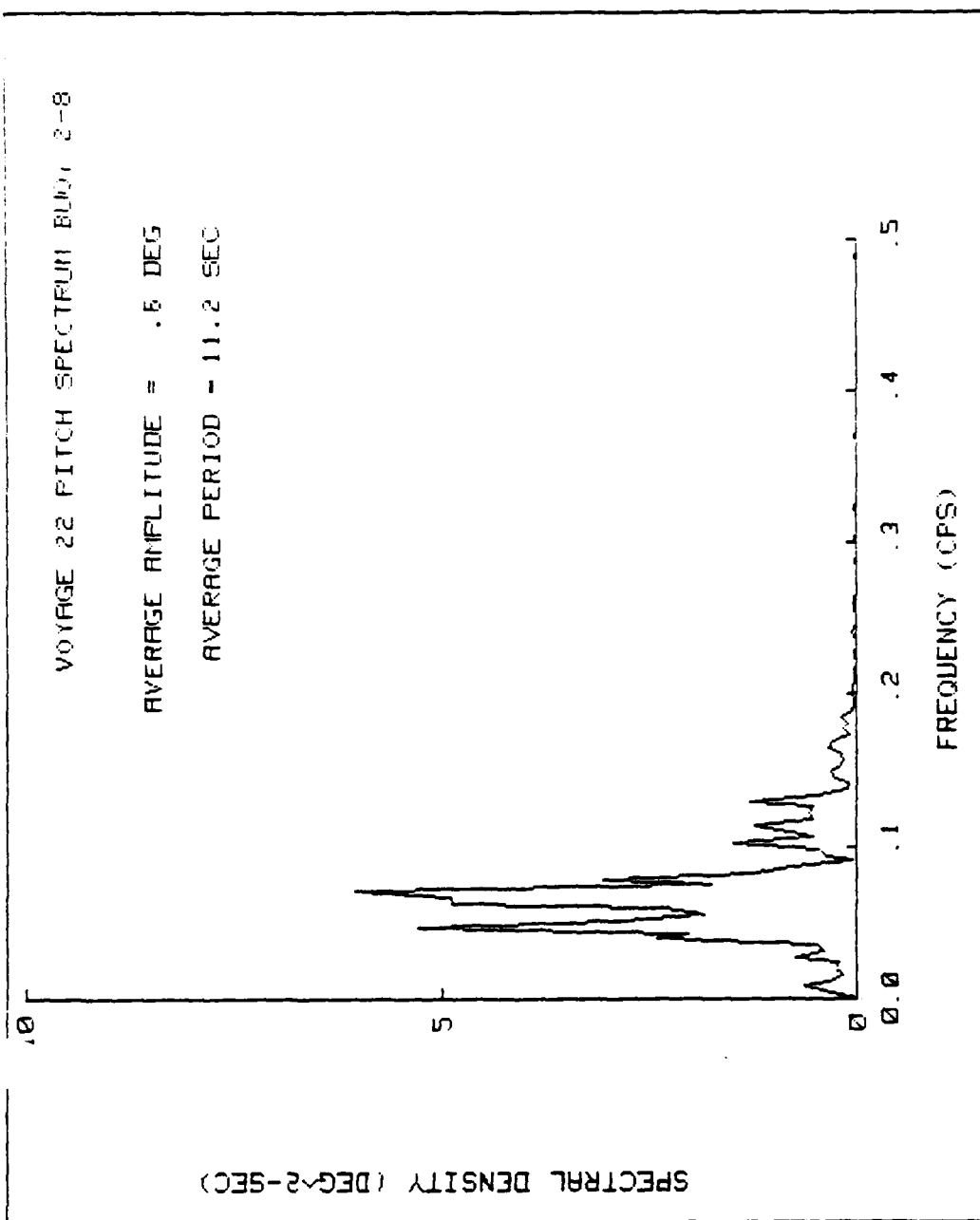




VOYAGE 22 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .6 DEG

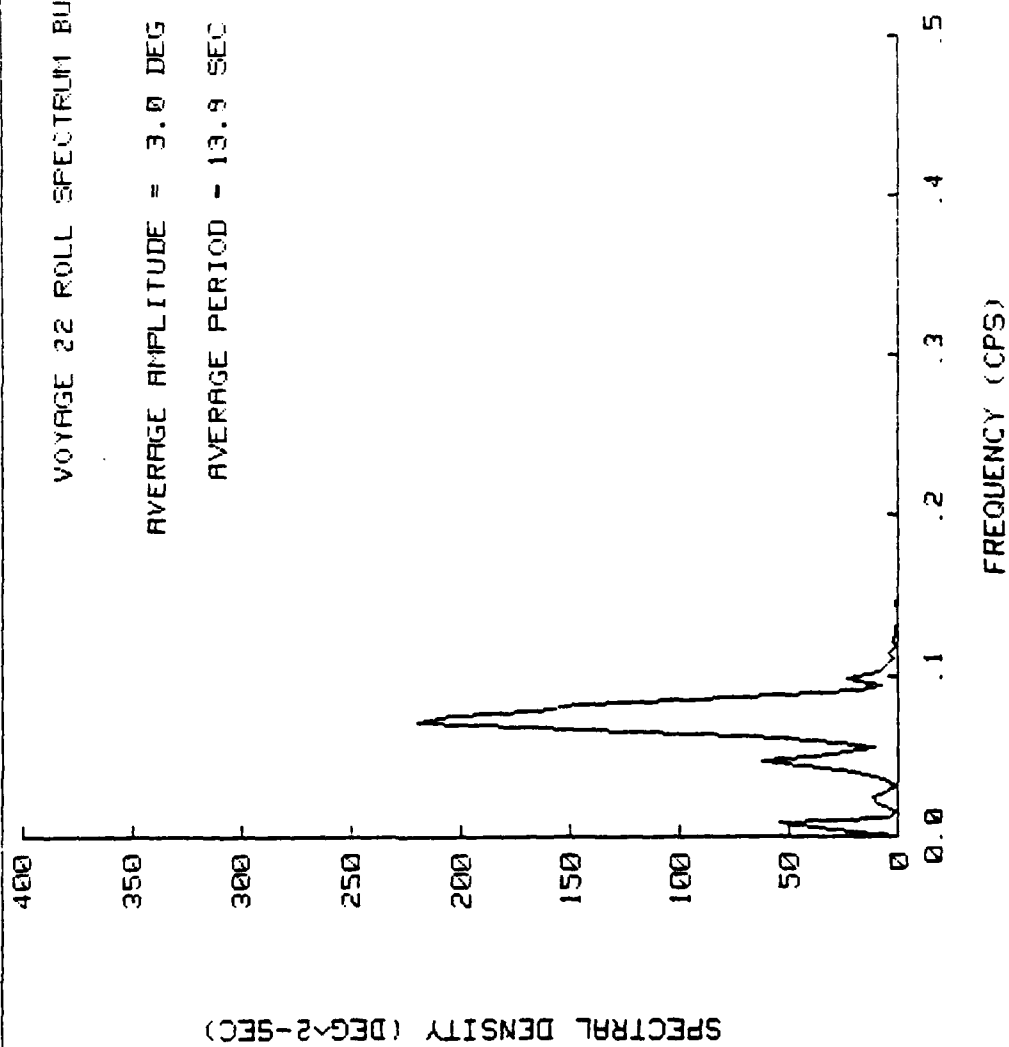
AVERAGE PERIOD = 11.2 SEC

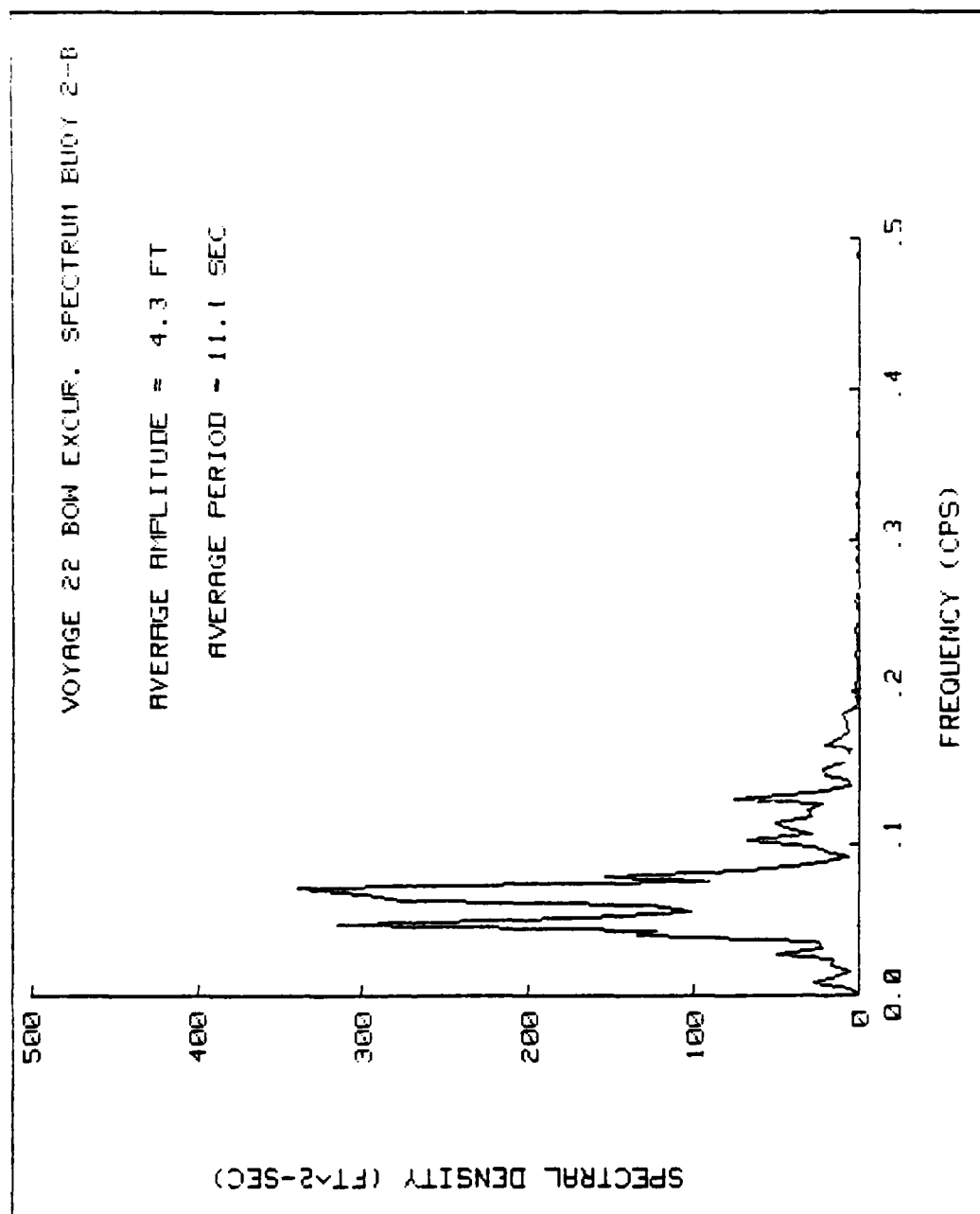


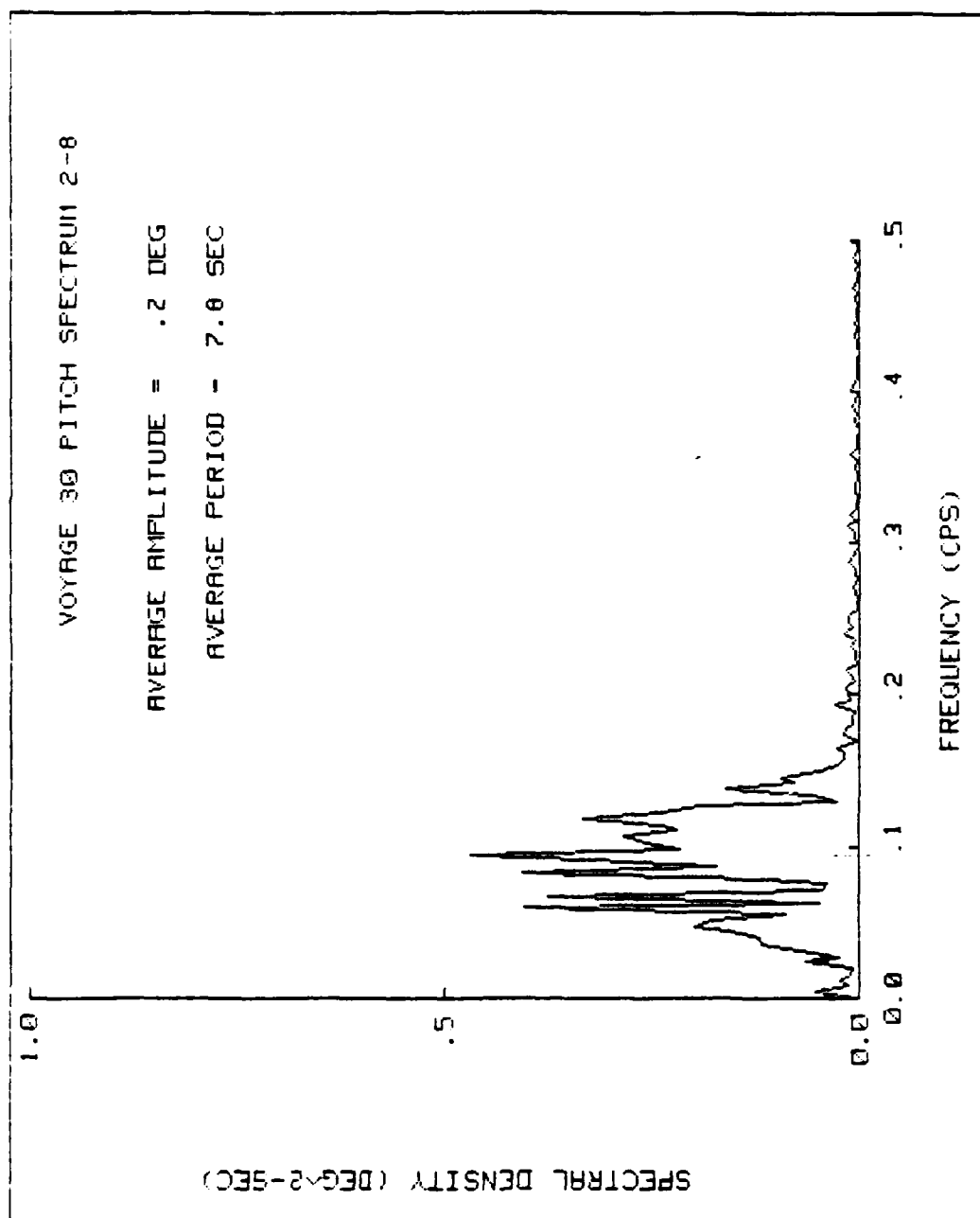
VOYAGE 22 ROLL SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 3.0 DEG

AVERAGE PERIOD = 13.9 SEC



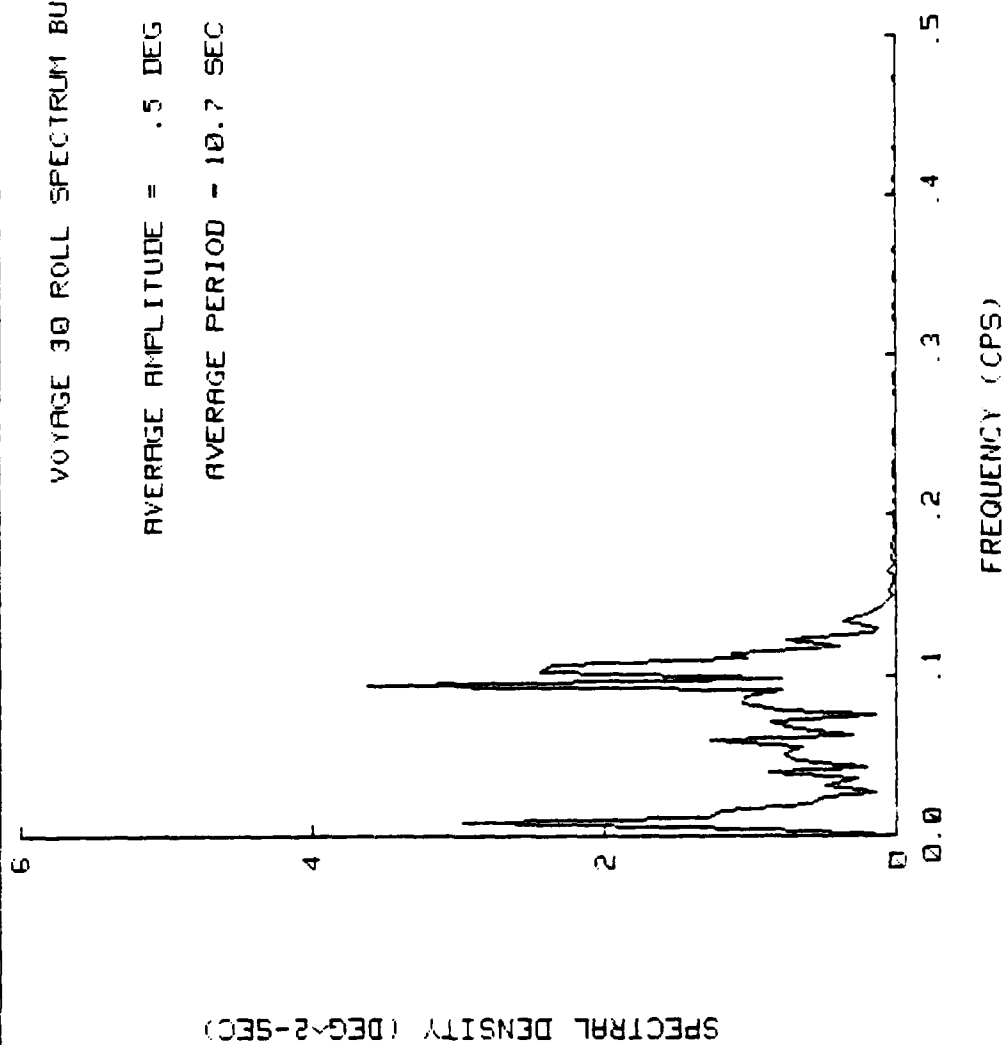




VOYAGE 30 ROLL SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .5 DEG

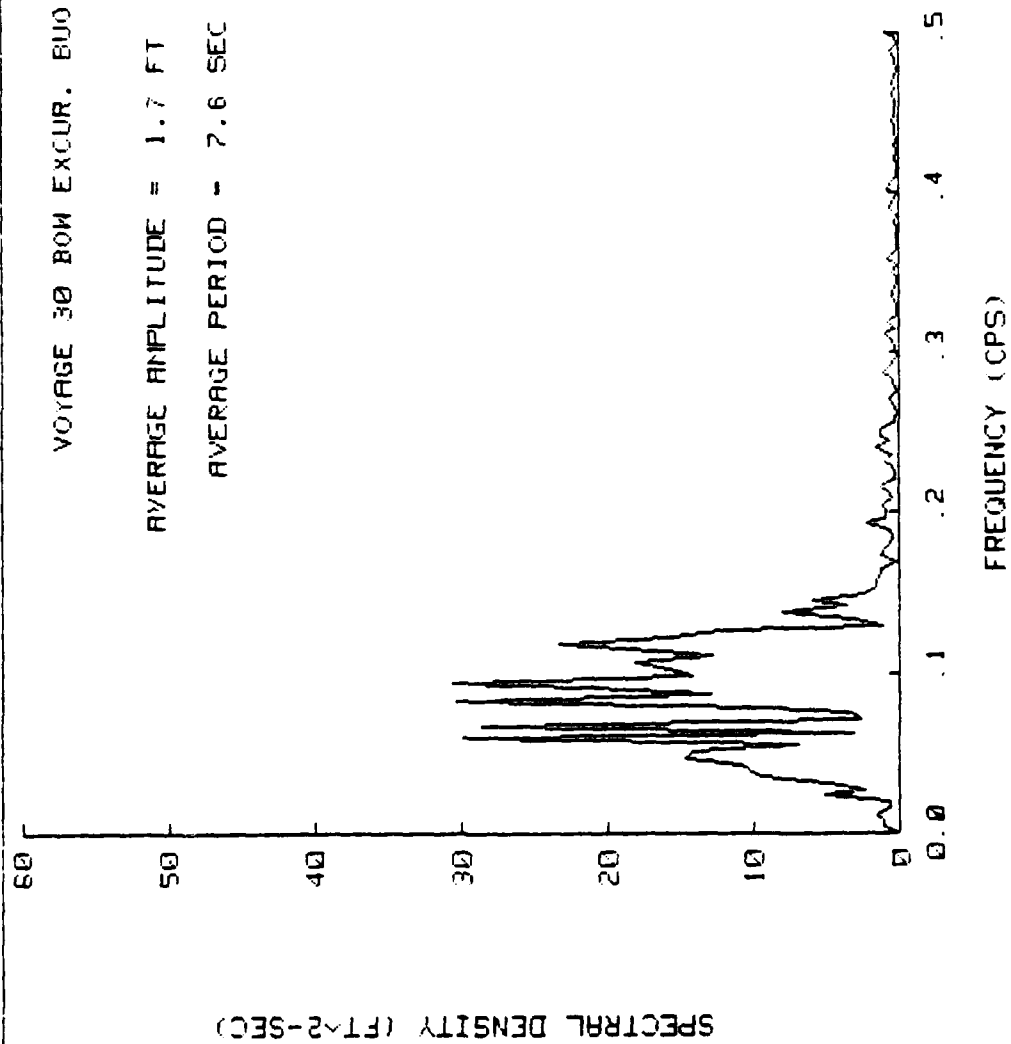
AVERAGE PERIOD = 10.7 SEC

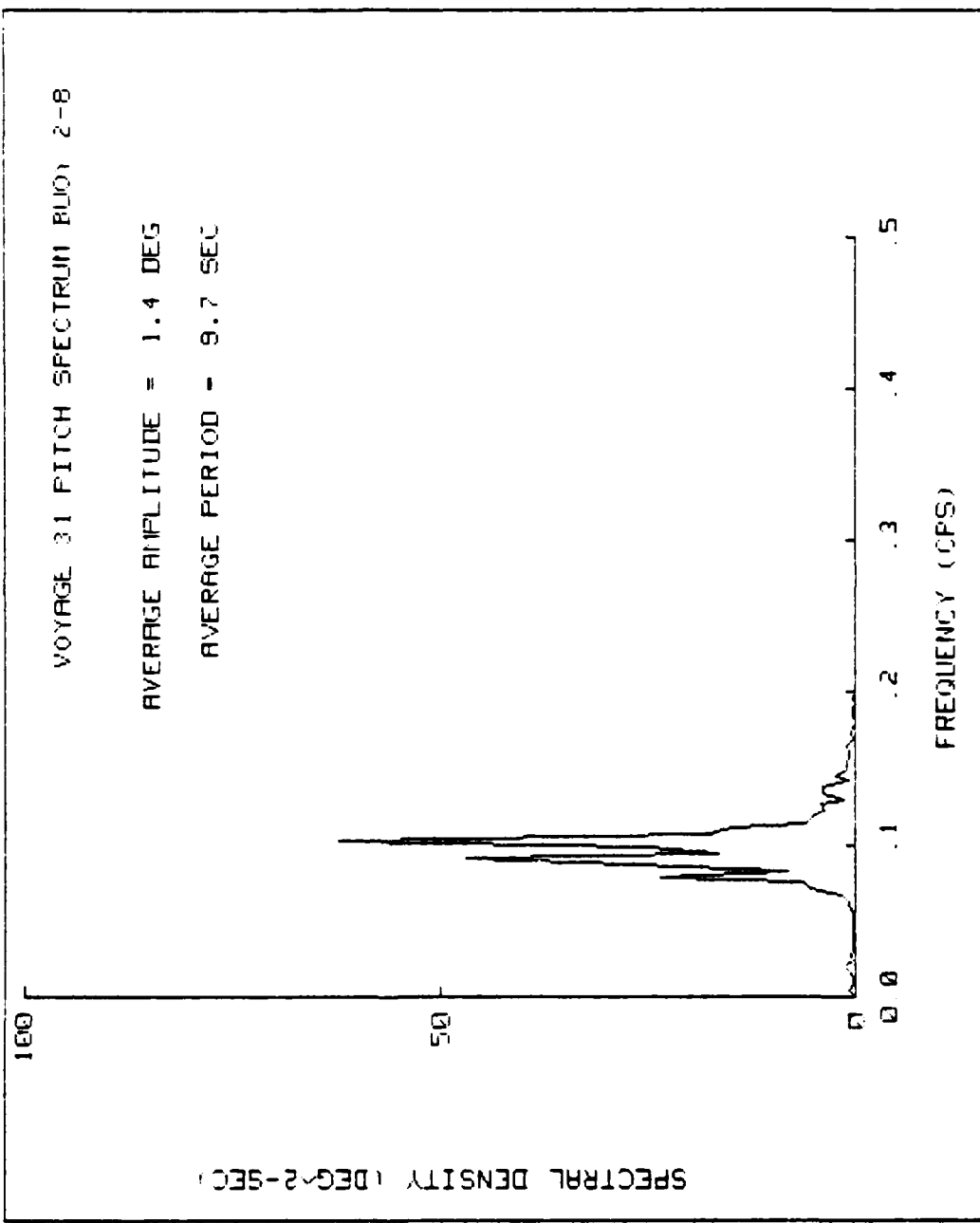


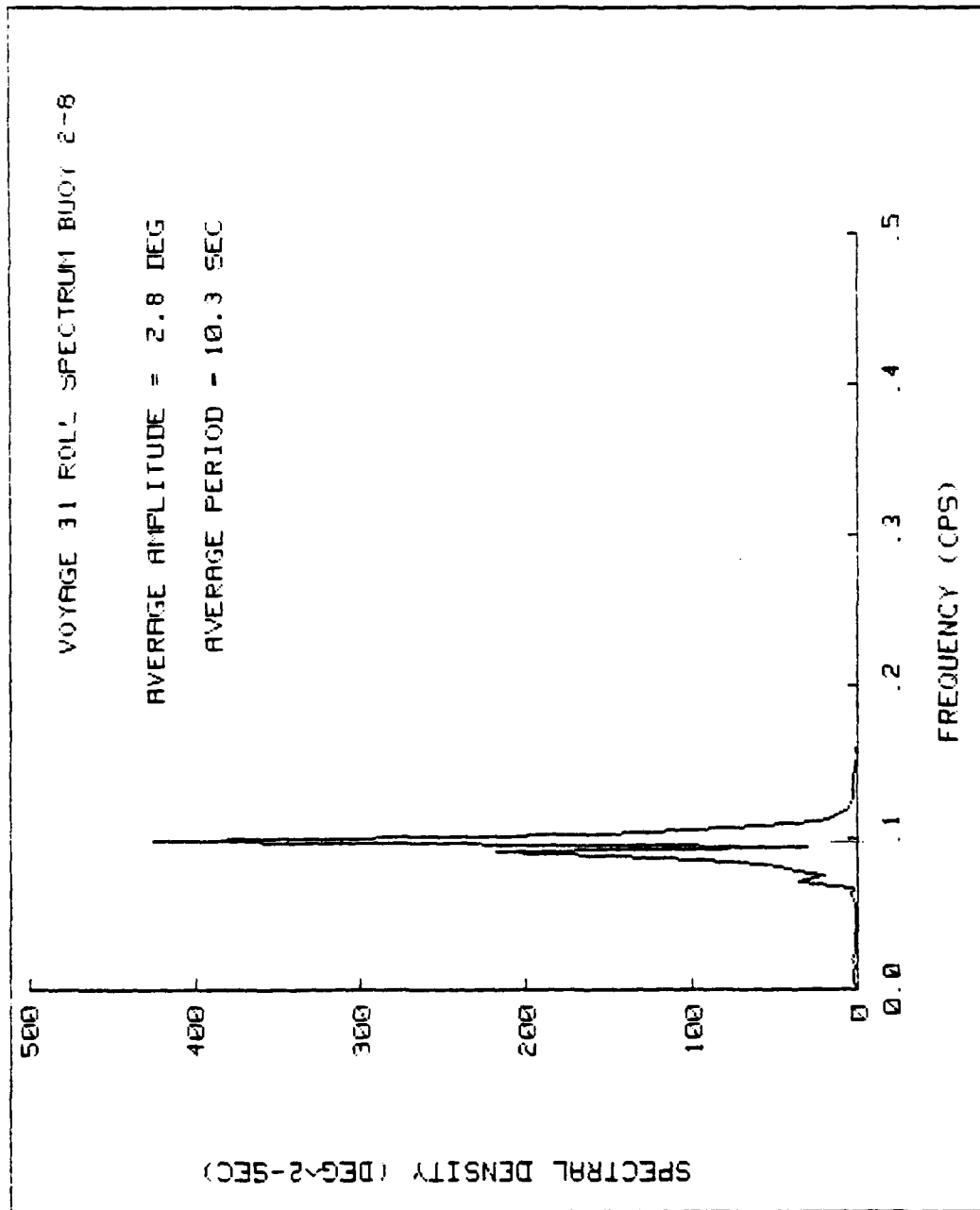
VOYAGE 30 BOW EXCUR. BU01 2-8

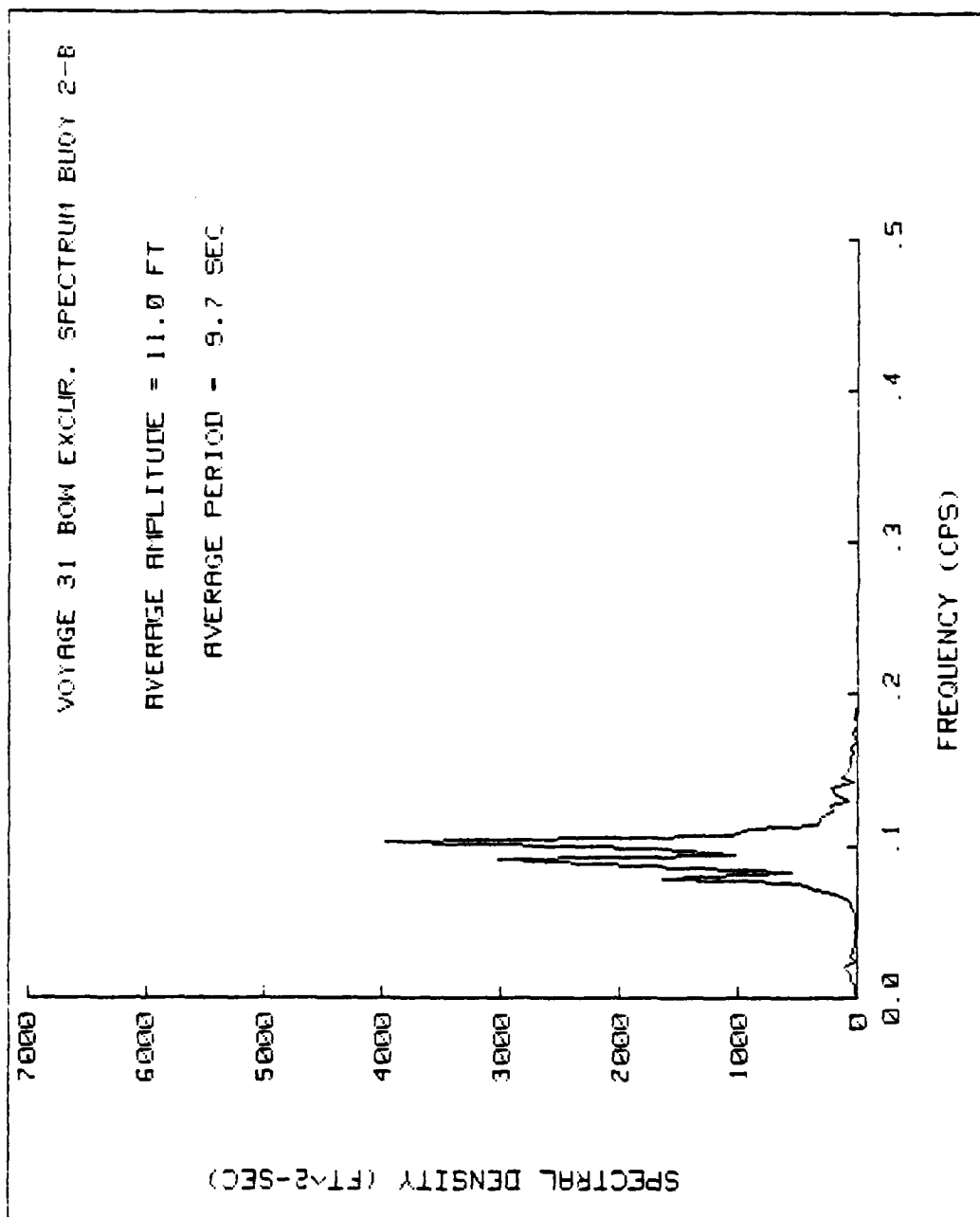
AVERAGE AMPLITUDE = 1.7 FT

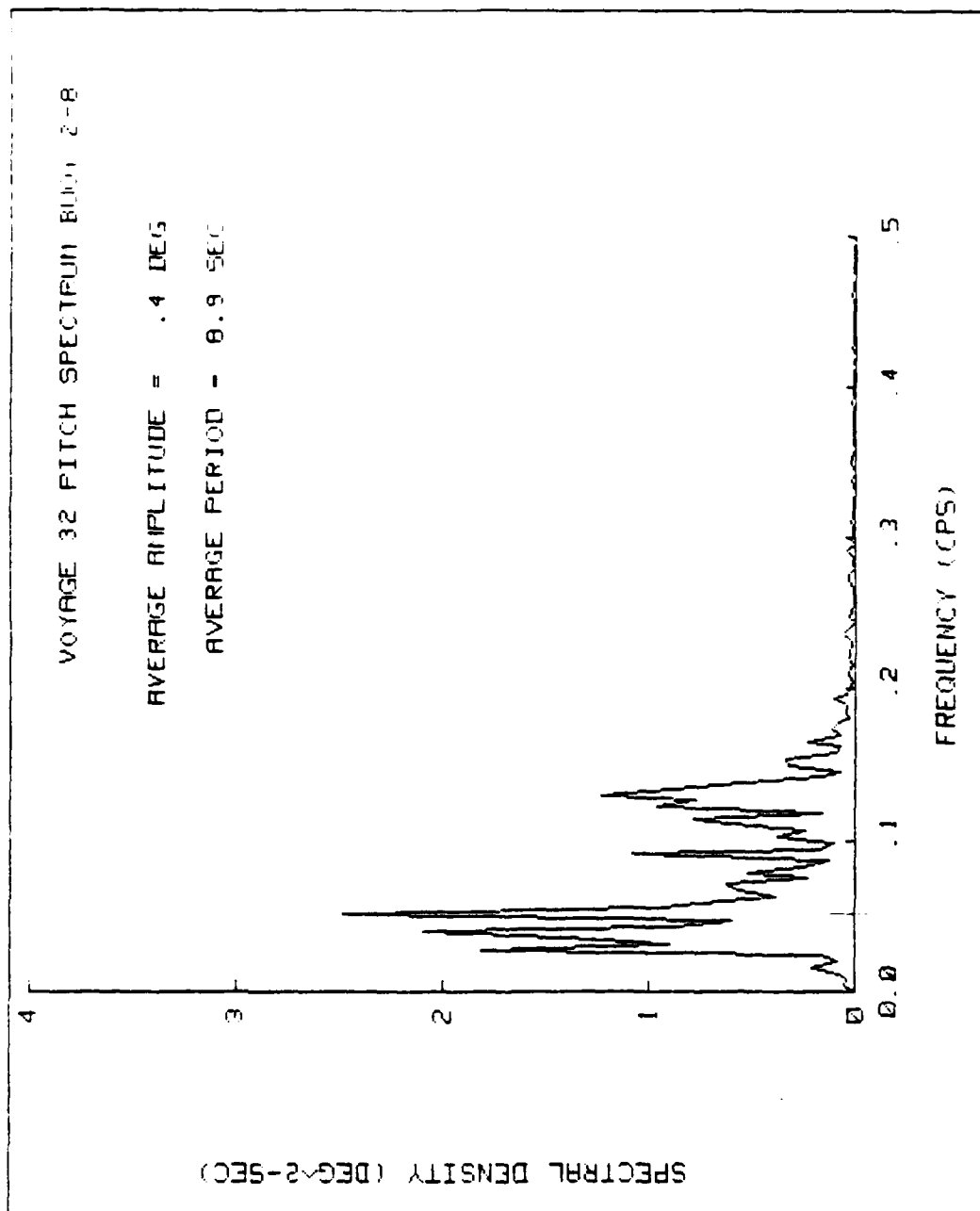
AVERAGE PERIOD = 7.6 SEC

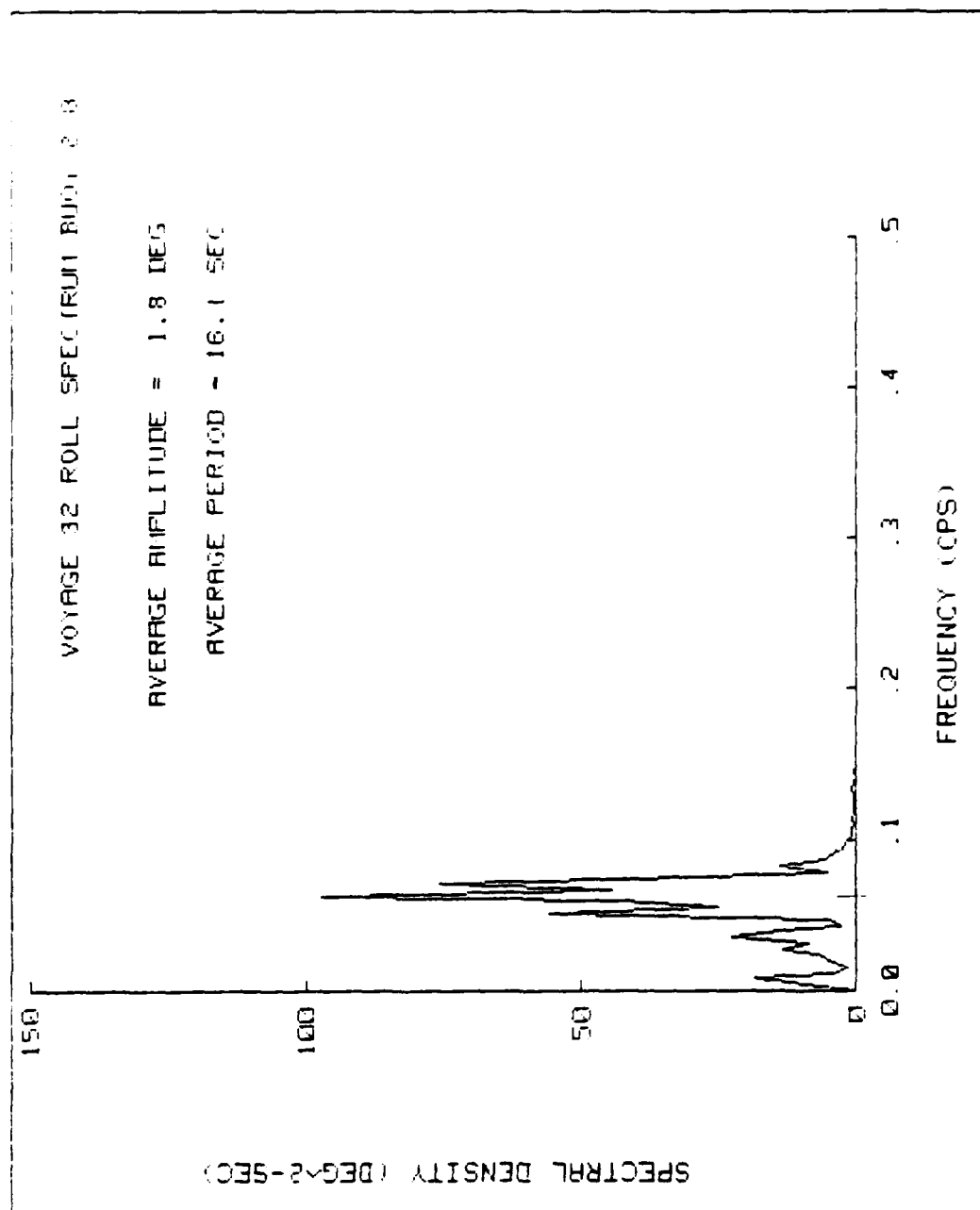


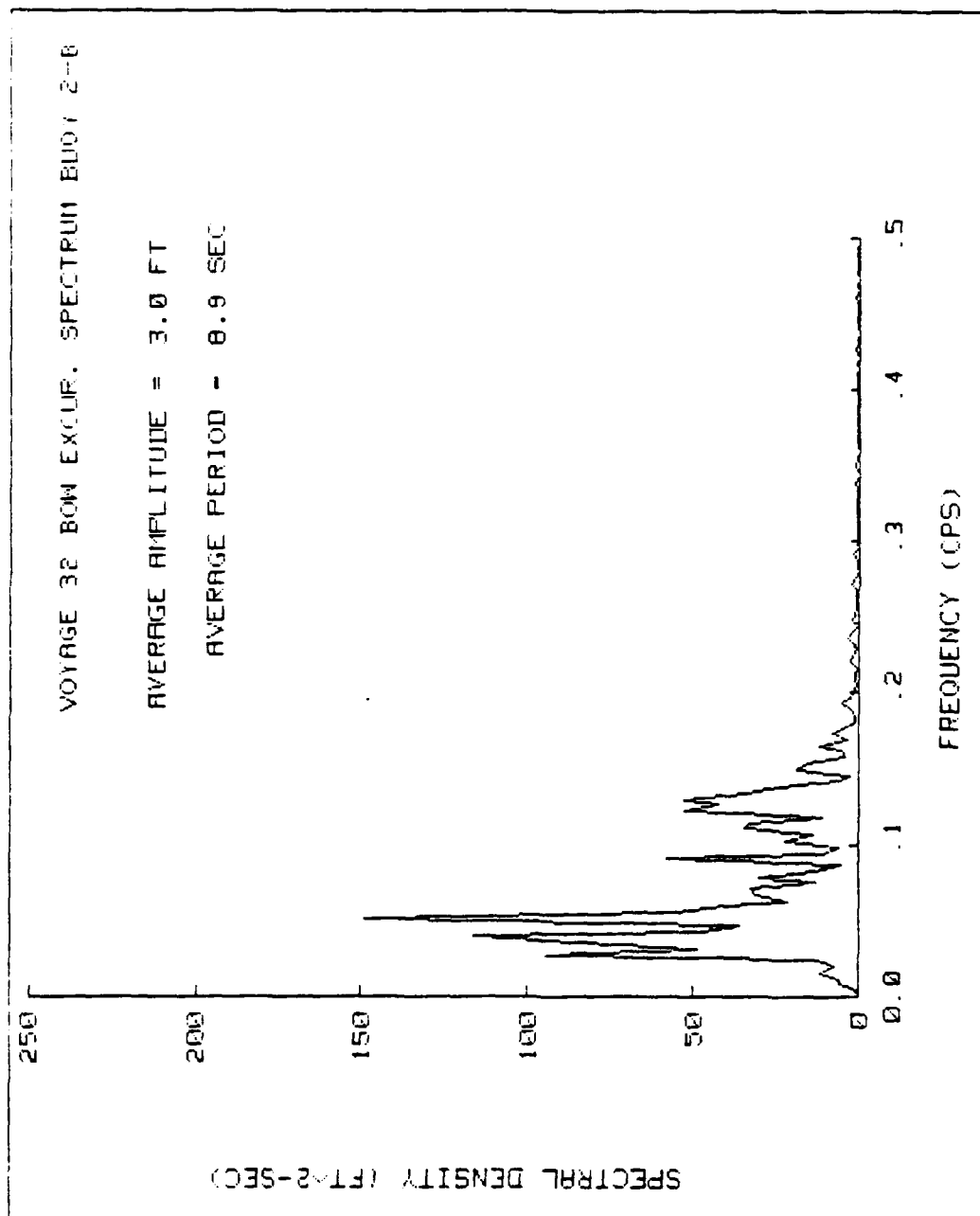








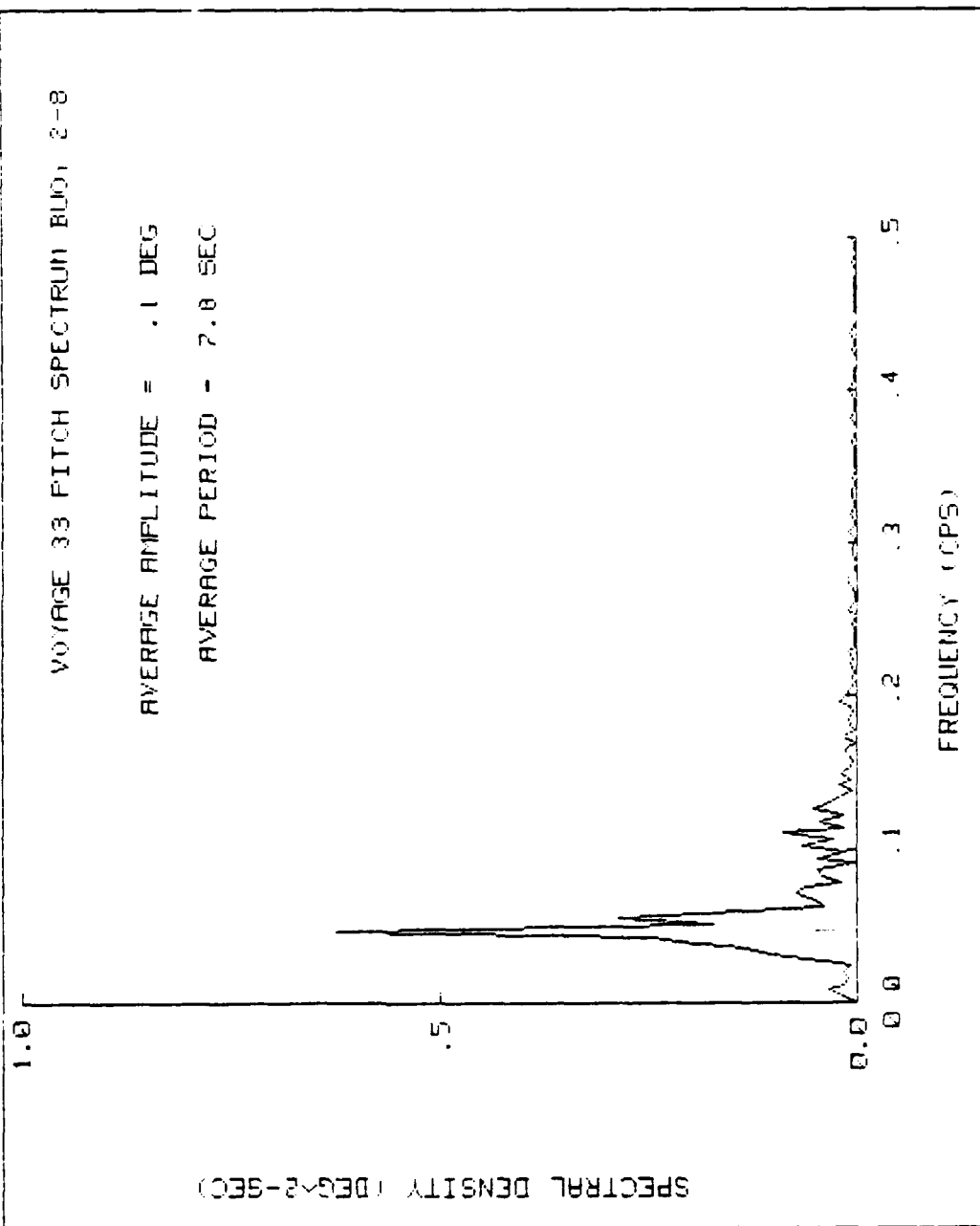




VOYAGE 33 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .1 DEG

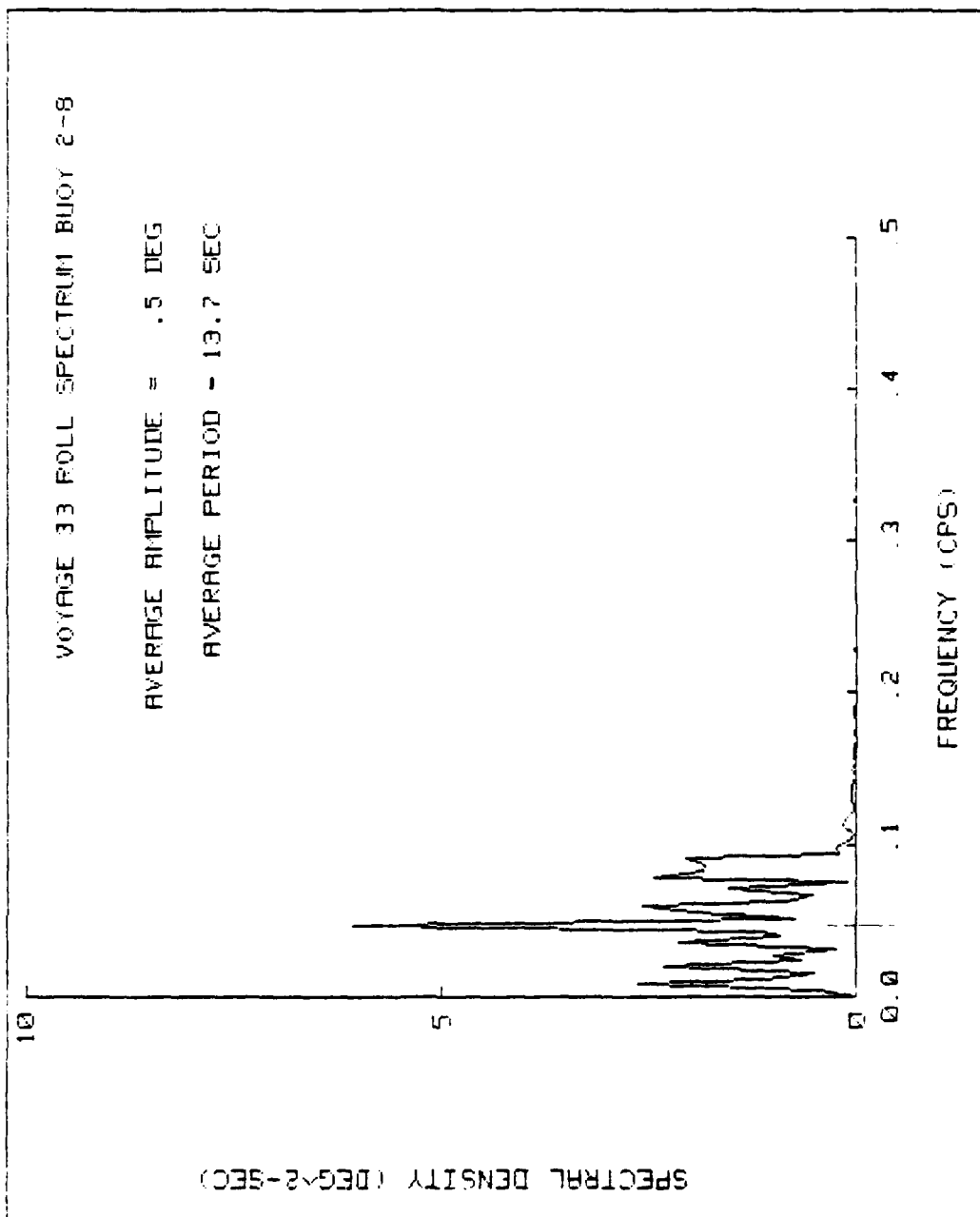
AVERAGE PERIOD = 7.0 SEC



VOYAGE 33 ROLL SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .5 DEG

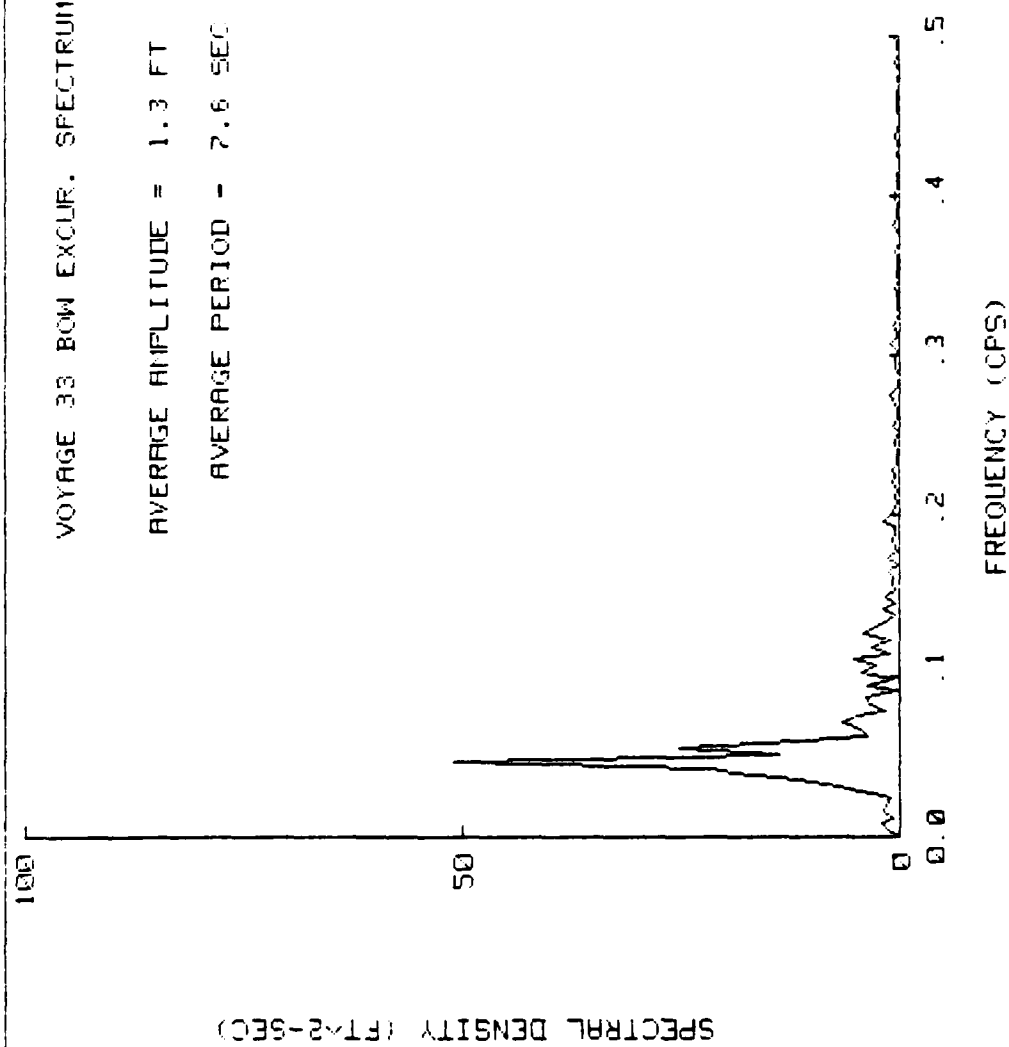
AVERAGE PERIOD = 13.7 SEC



VOYAGE 33 BOW EXCUR. SPECTRUM BUOY 2-B

AVERAGE AMPLITUDE = 1.3 FT

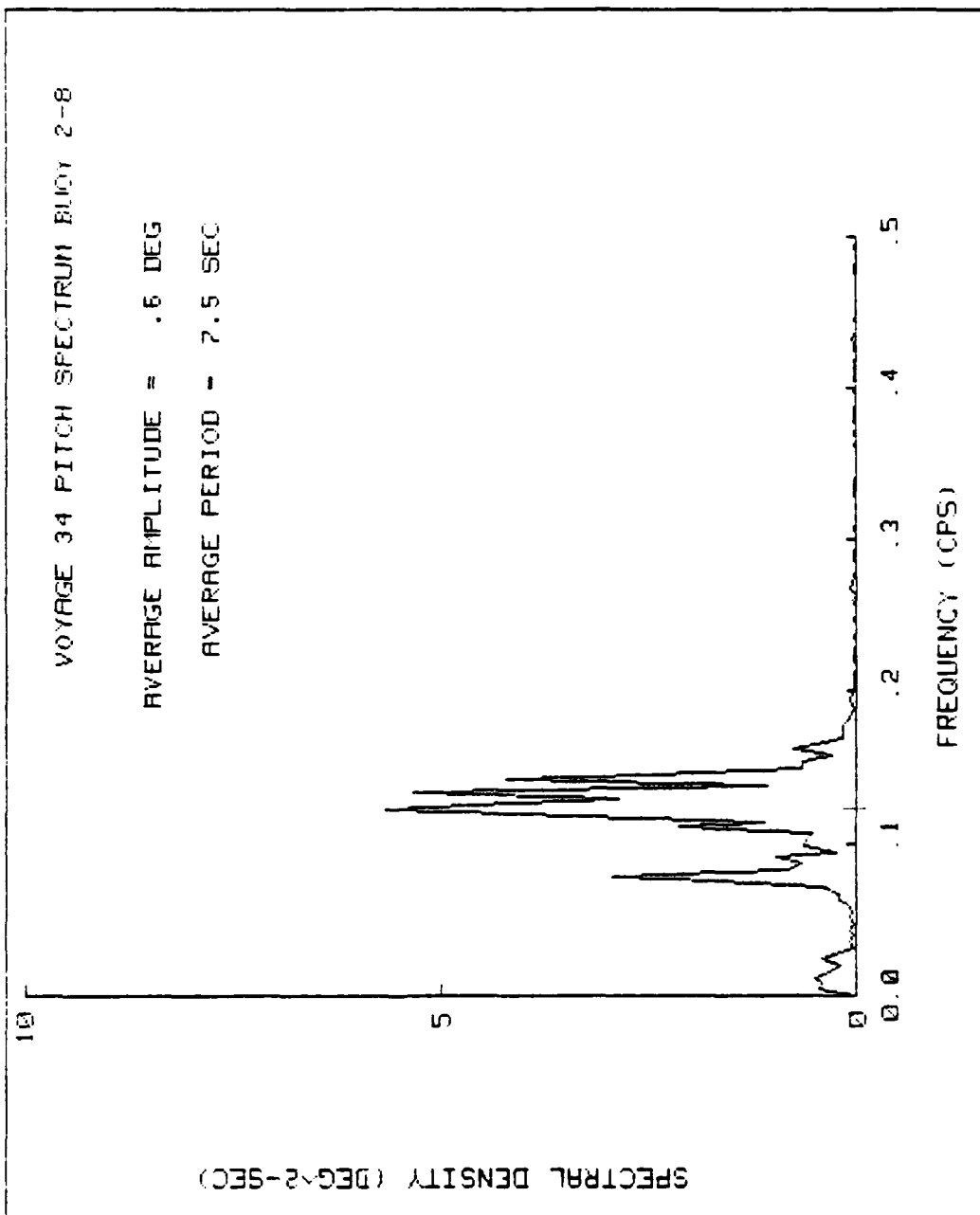
AVERAGE PERIOD = 7.6 SEC

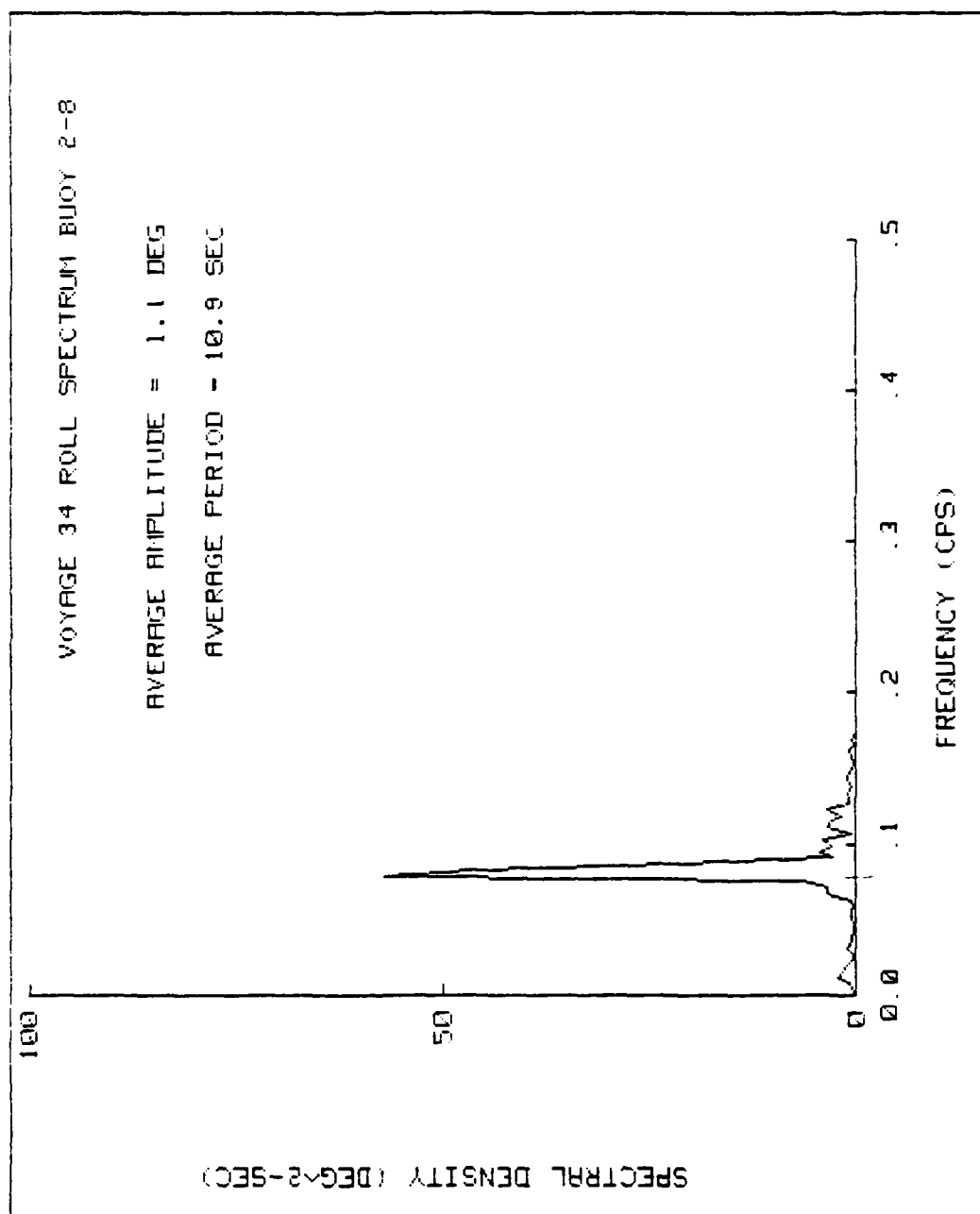


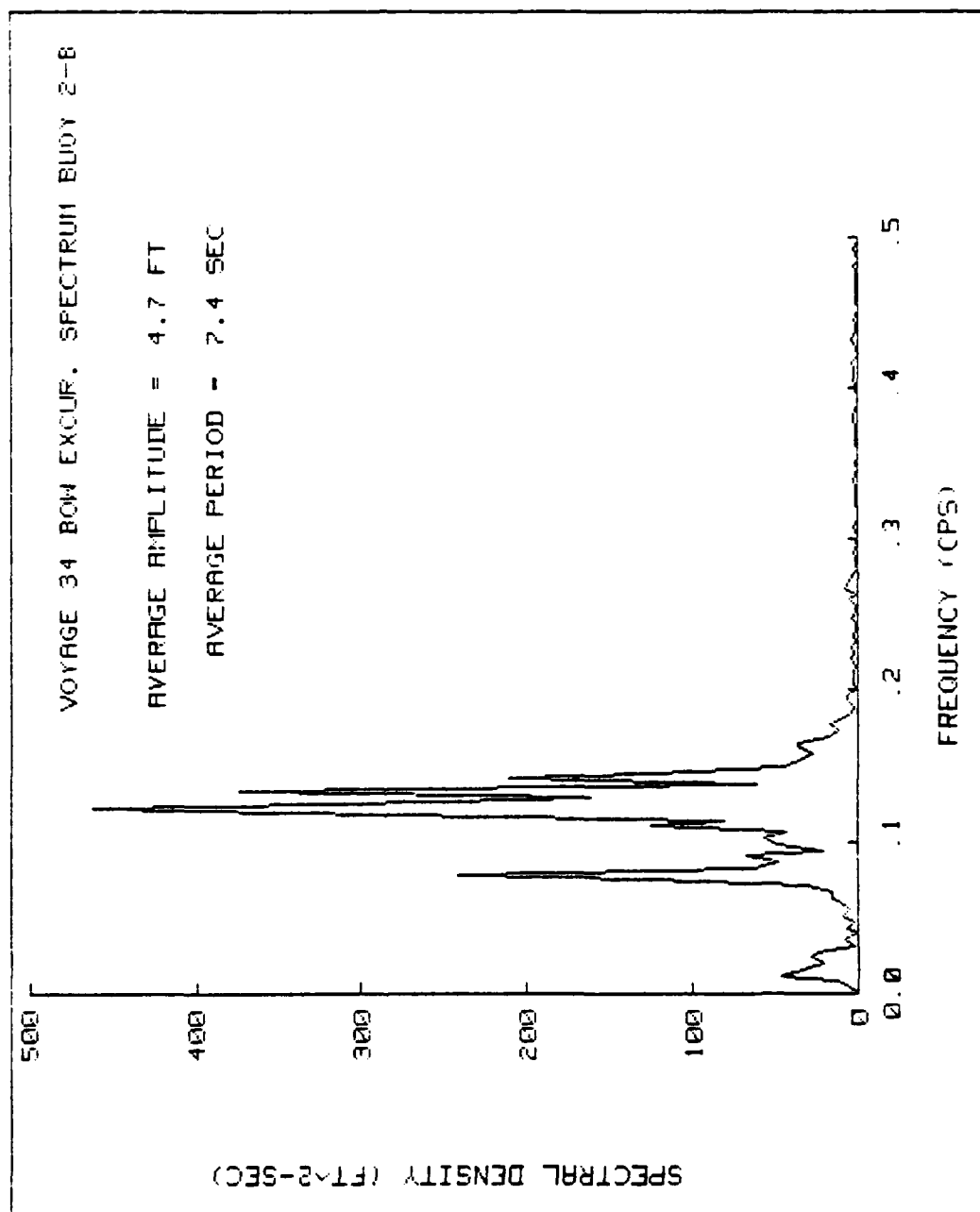
VOYAGE 34 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .6 DEG

AVERAGE PERIOD = 7.5 SEC



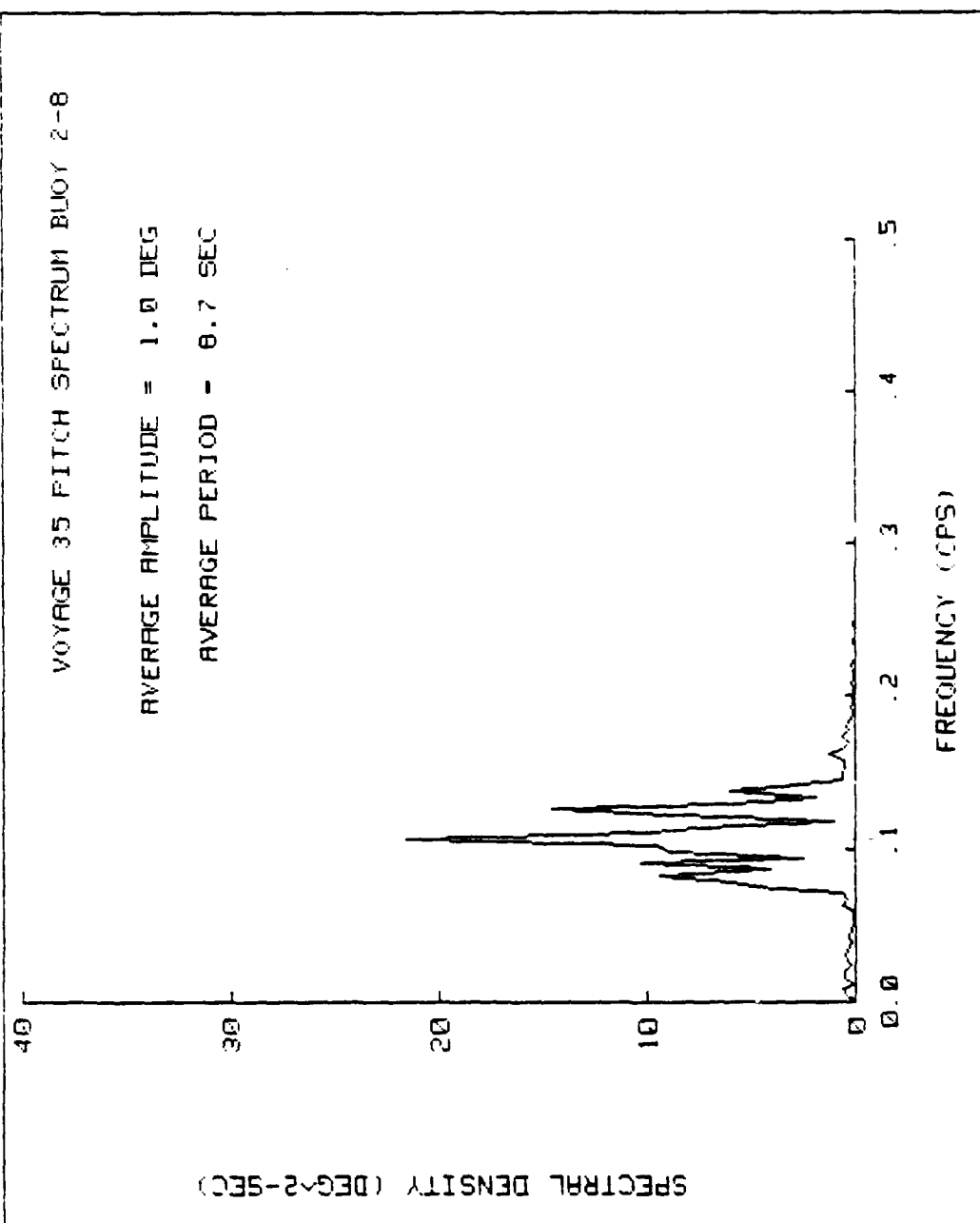




VOYAGE 35 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 1.0 DEG

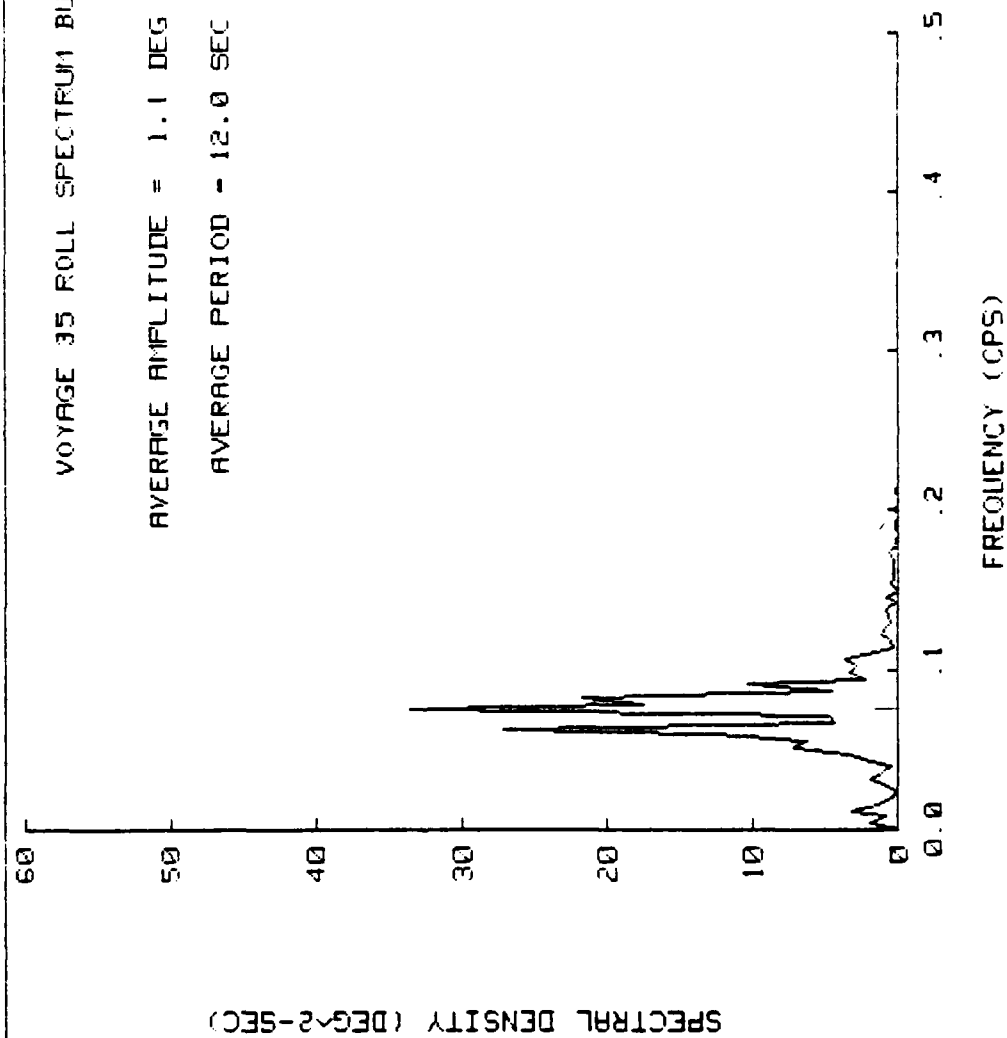
AVERAGE PERIOD = 0.7 SEC

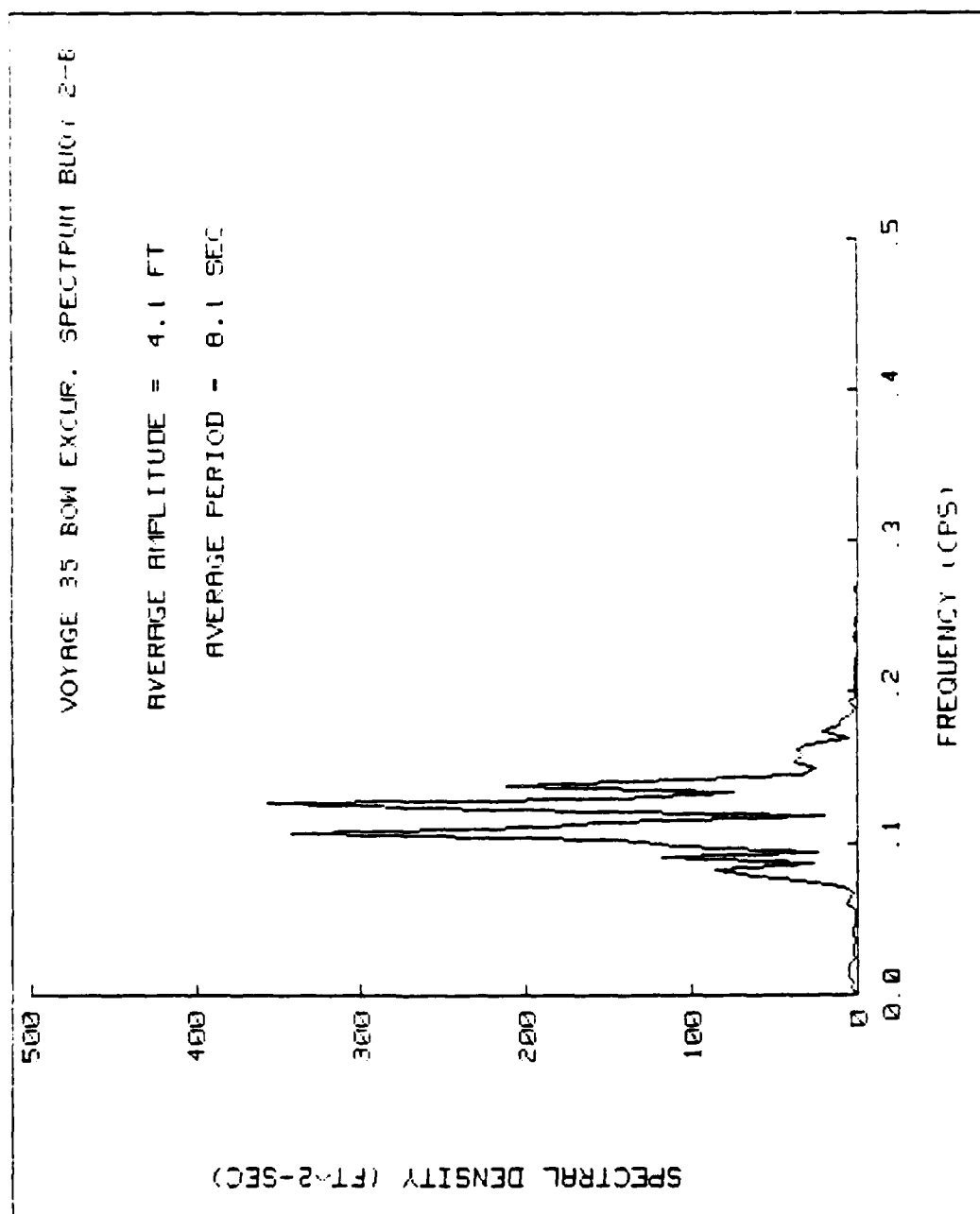


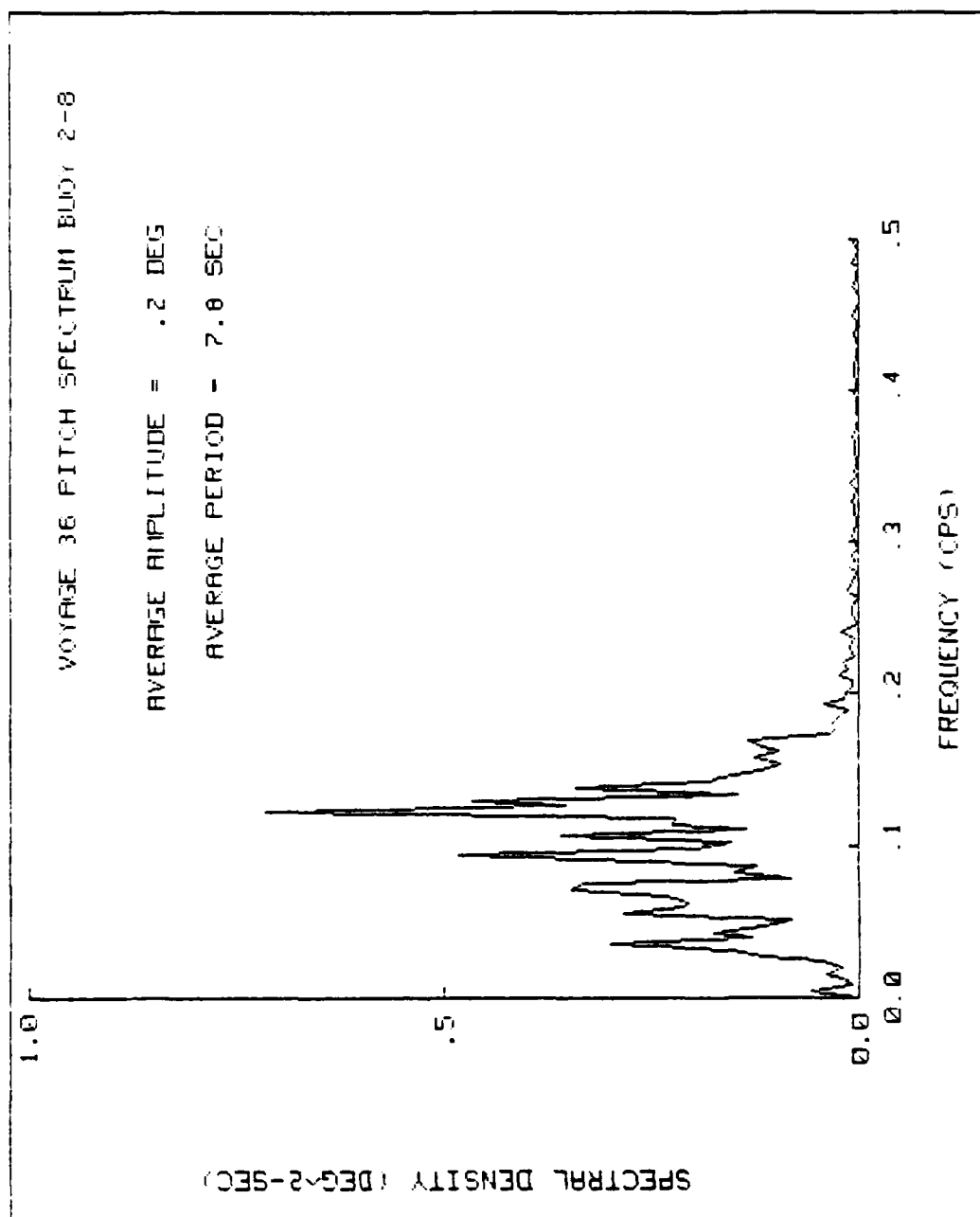
VOYAGE 35 ROLL SPECTRUM BUOY 2-8

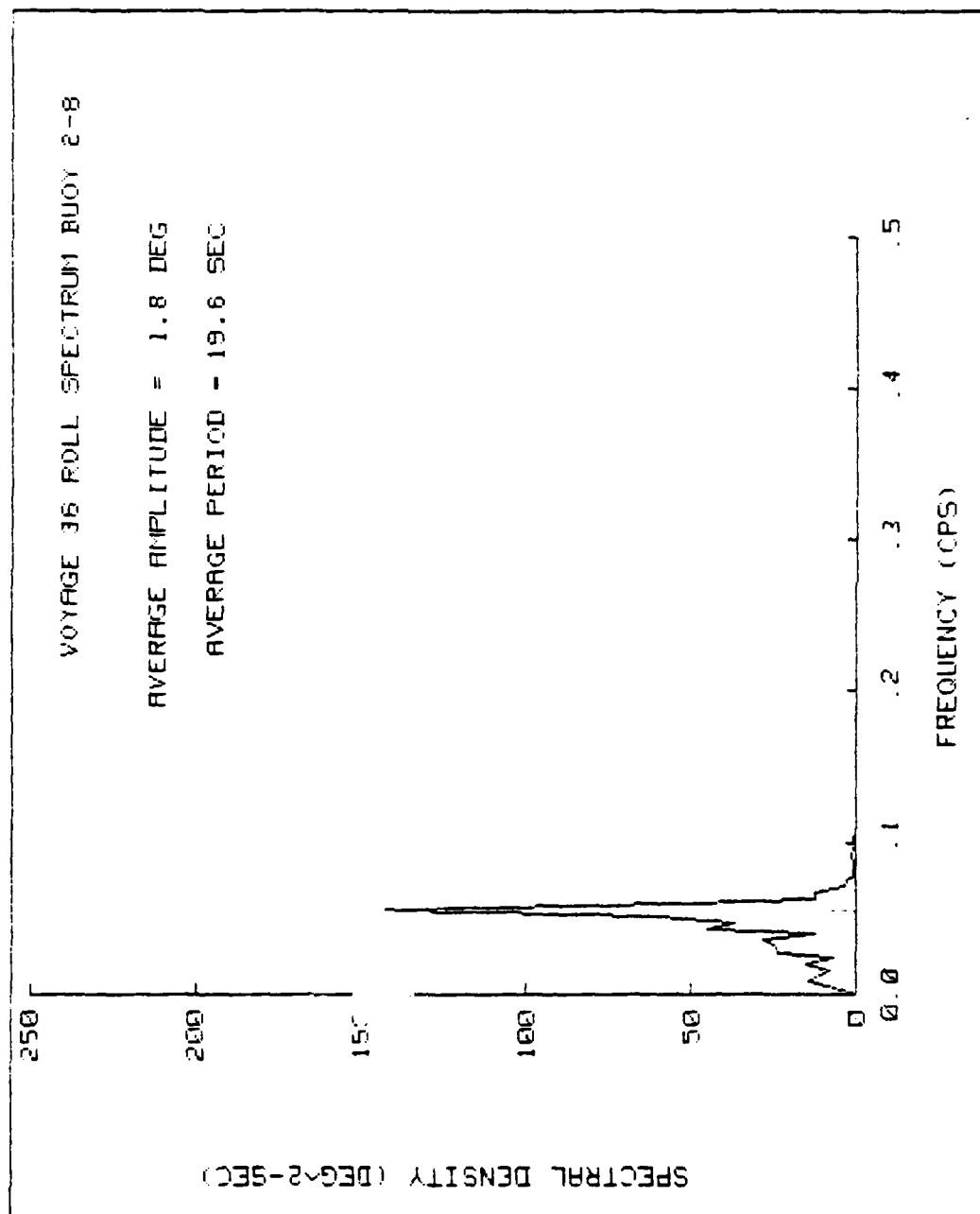
AVERAGE AMPLITUDE = 1.1 DEG

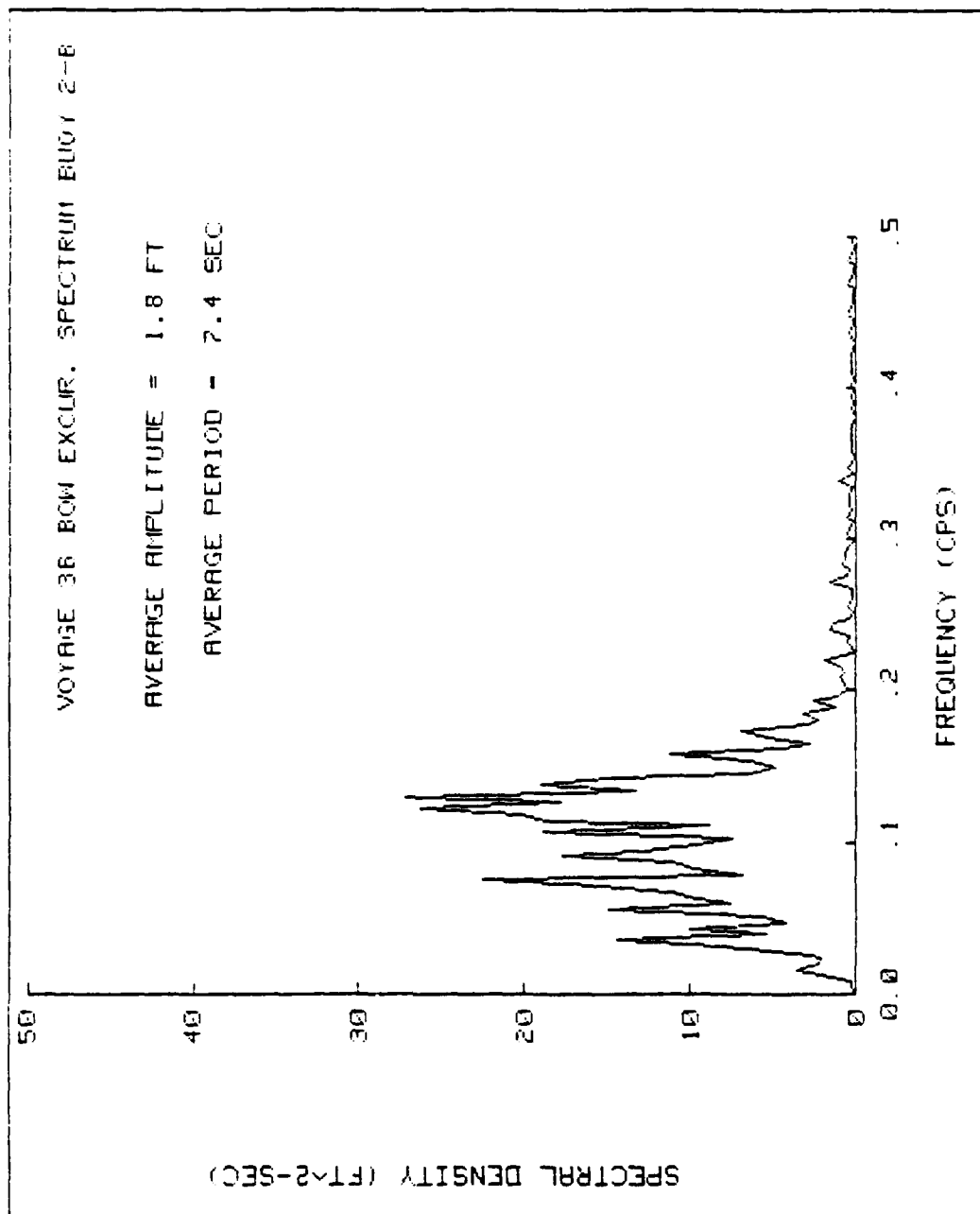
AVERAGE PERIOD = 12.0 SEC

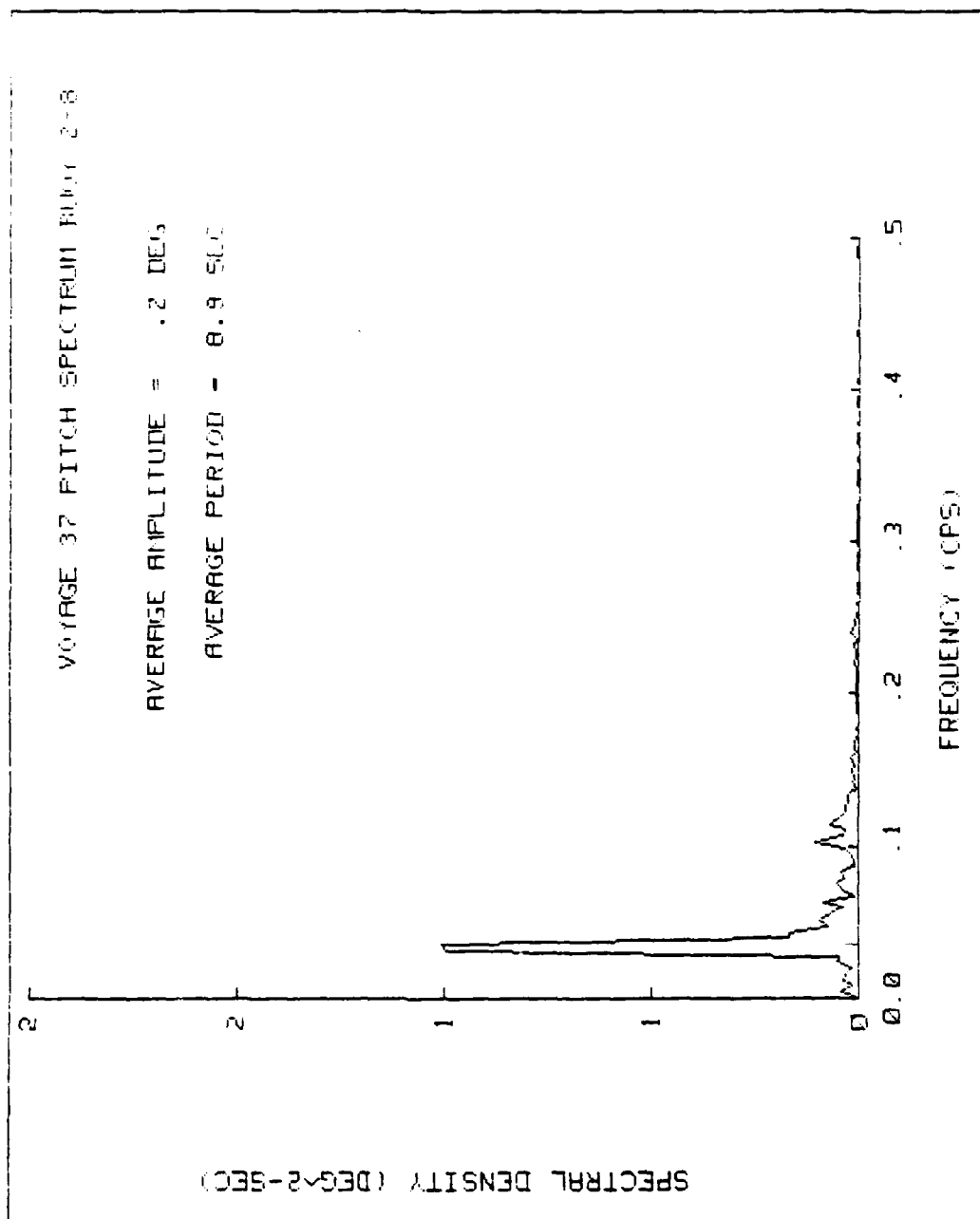








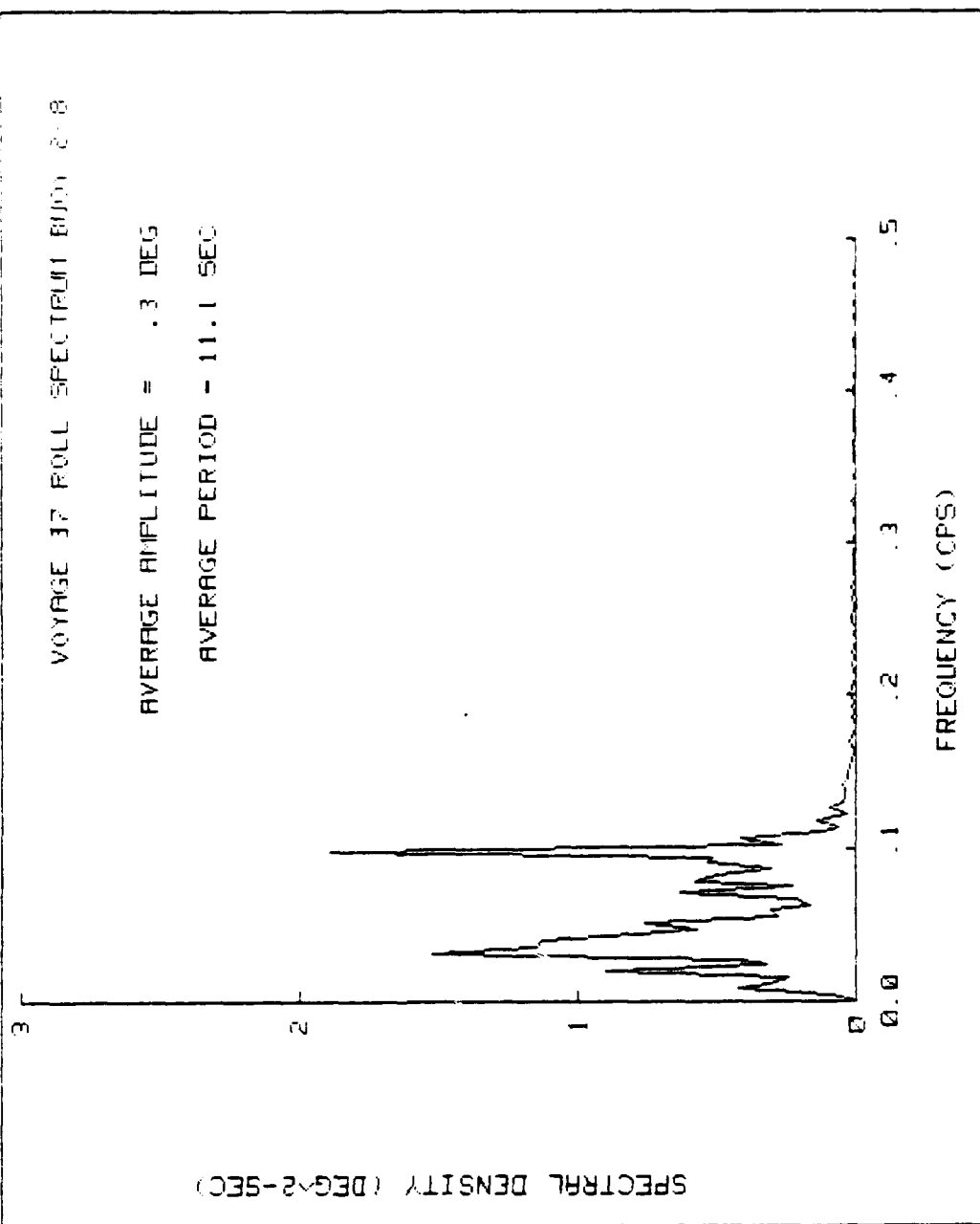


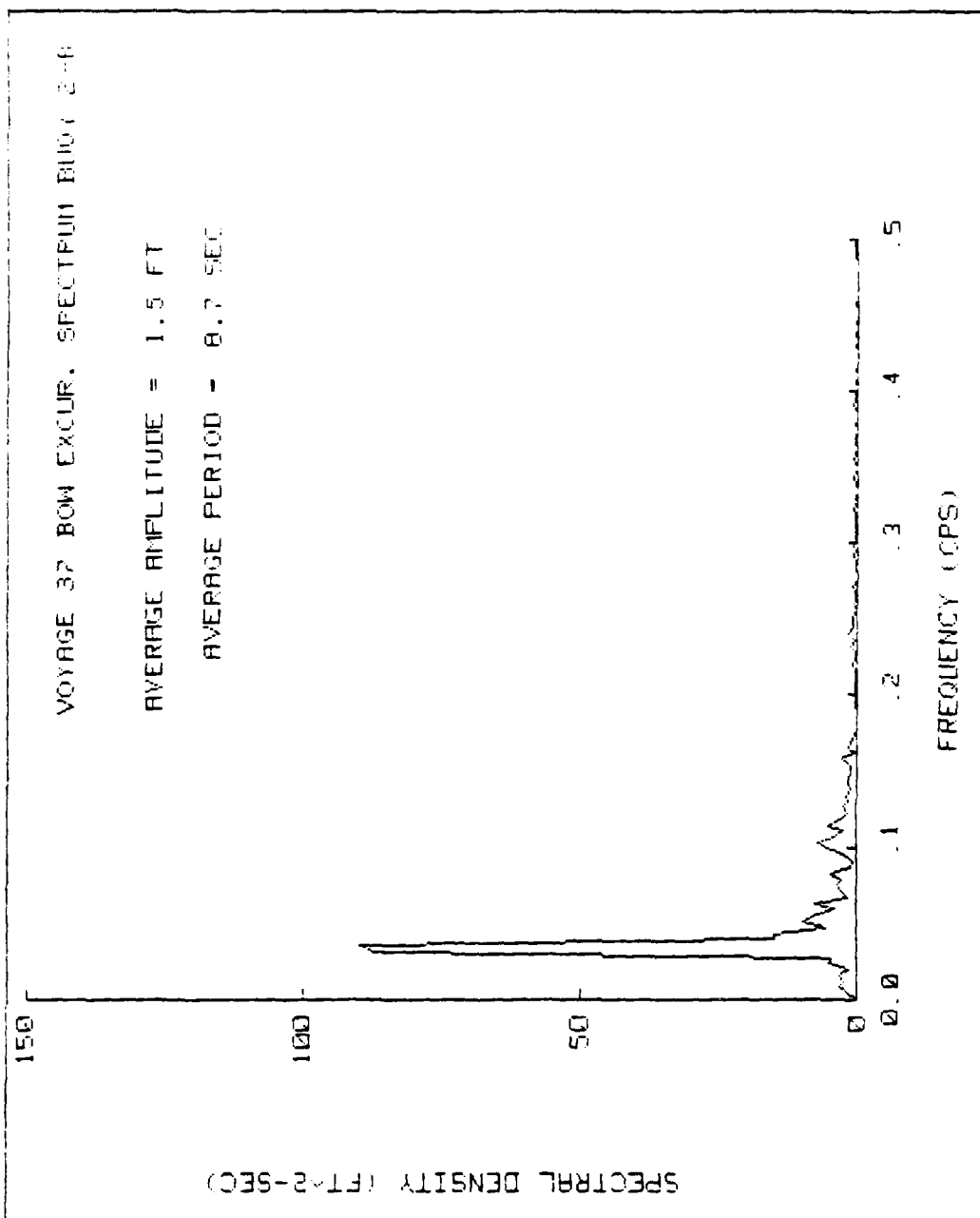


VOYAGE 17 ROLL SPECTRUM BUDD 2-8

AVERAGE AMPLITUDE = .3 DEG

AVERAGE PERIOD = 11.1 SEC

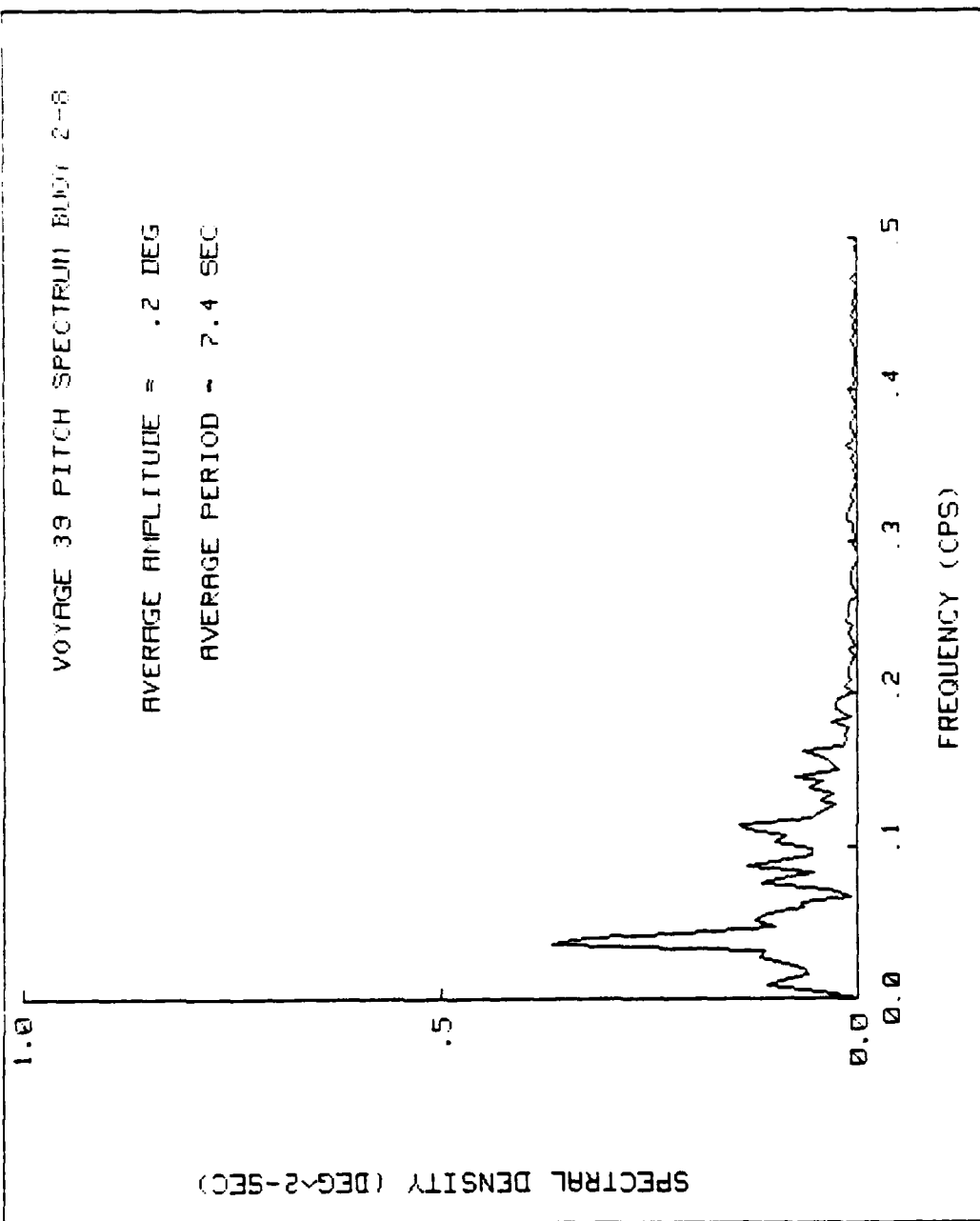


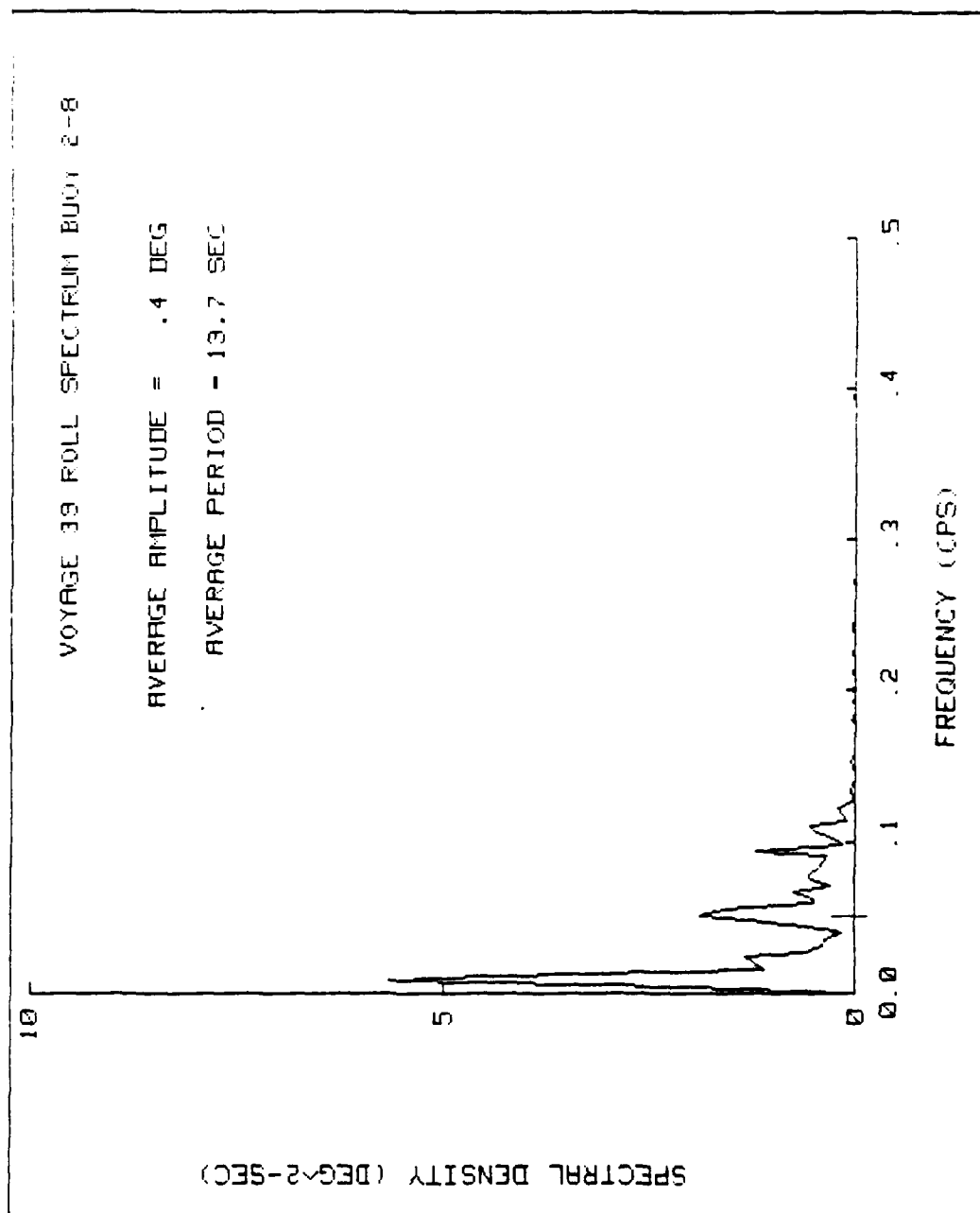


VOYAGE 39 PITCH SPECTRUM BUDY 2-8

AVERAGE AMPLITUDE = .2 DEG

AVERAGE PERIOD = 7.4 SEC

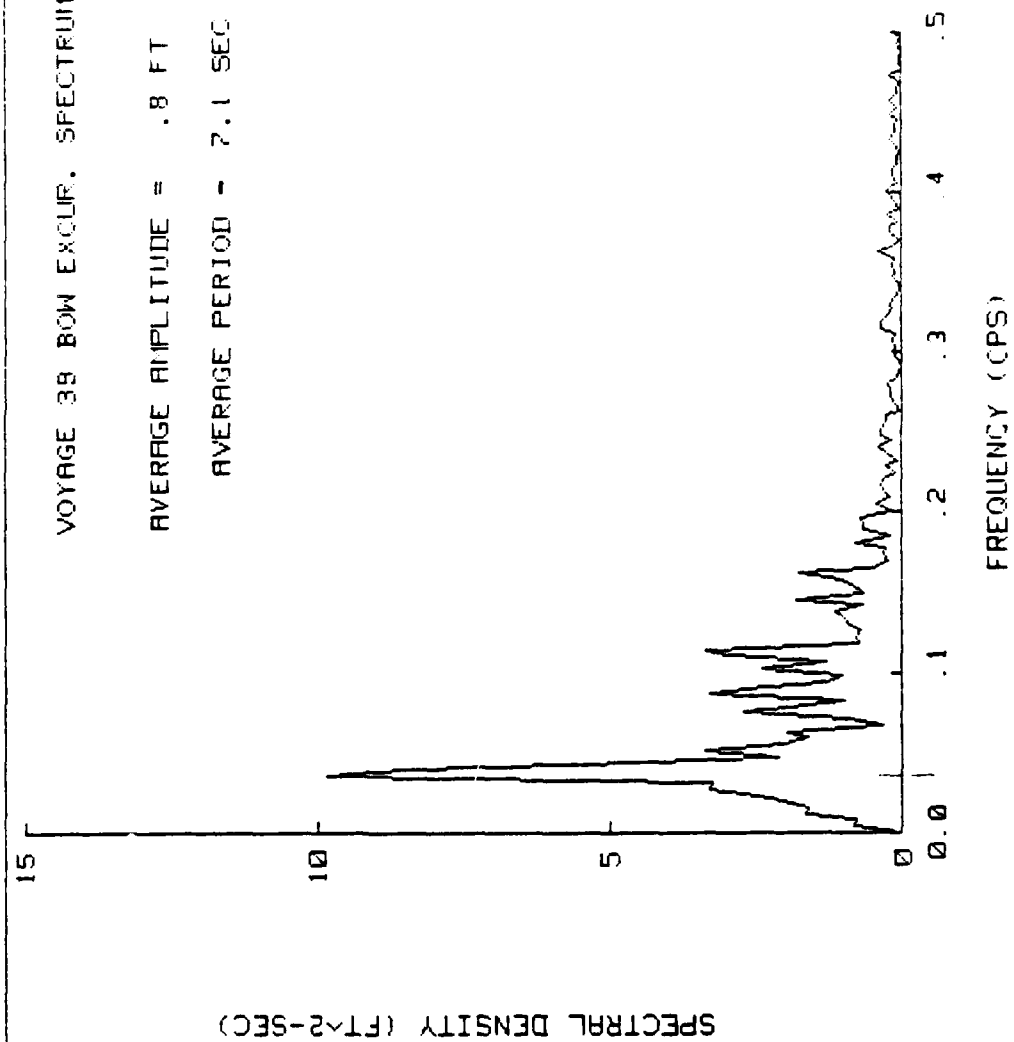




VOYAGE 39 BOW EXCUR. SPECTRUM BUDY 2-B

AVERAGE AMPLITUDE = .8 FT

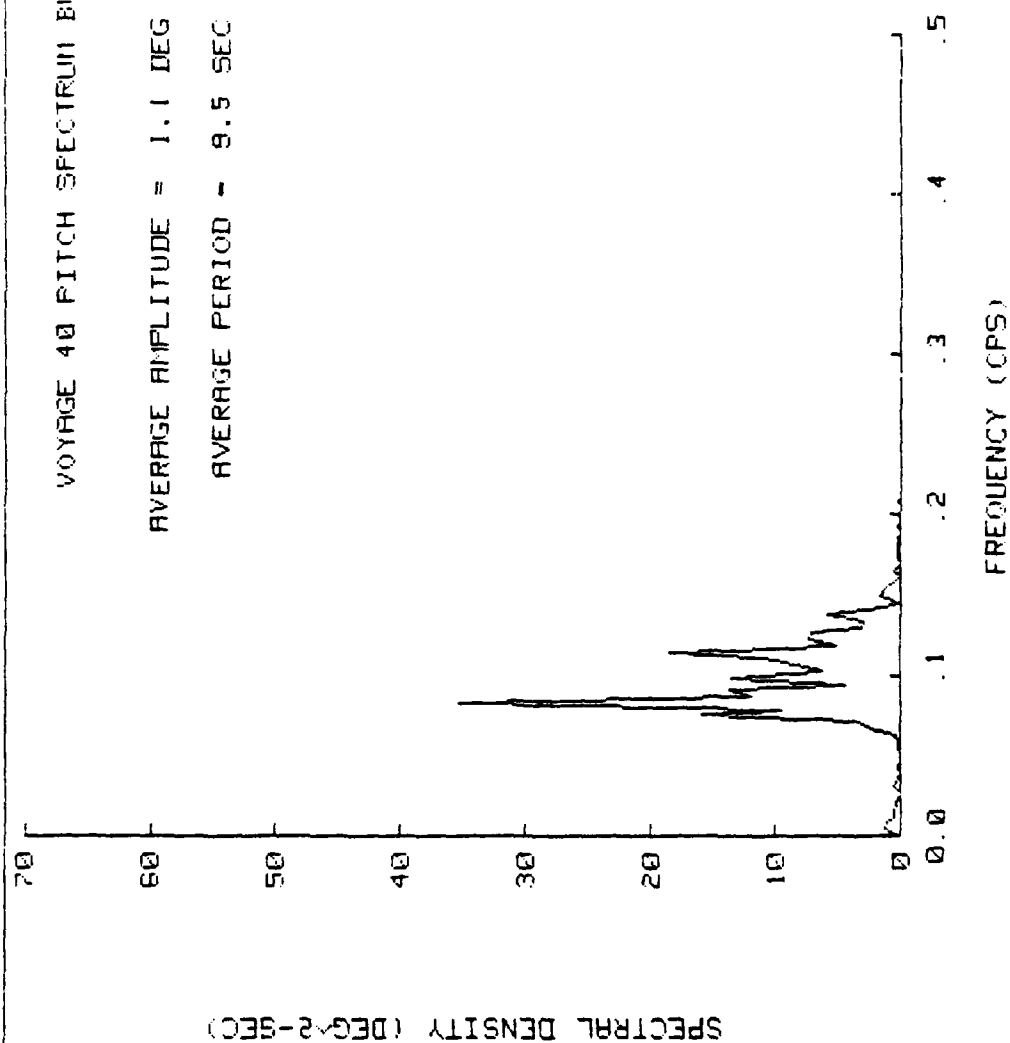
AVERAGE PERIOD = 7.1 SEC

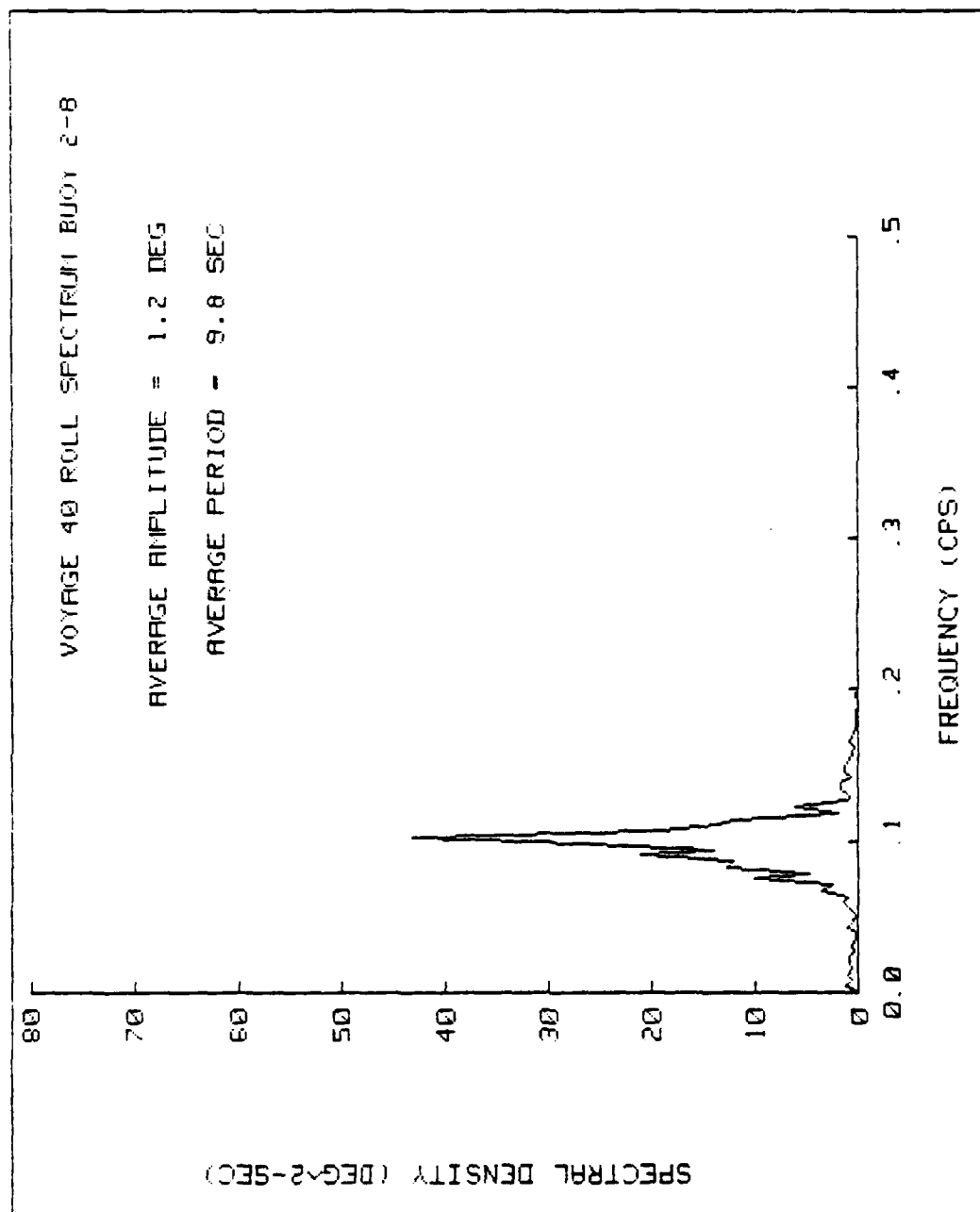


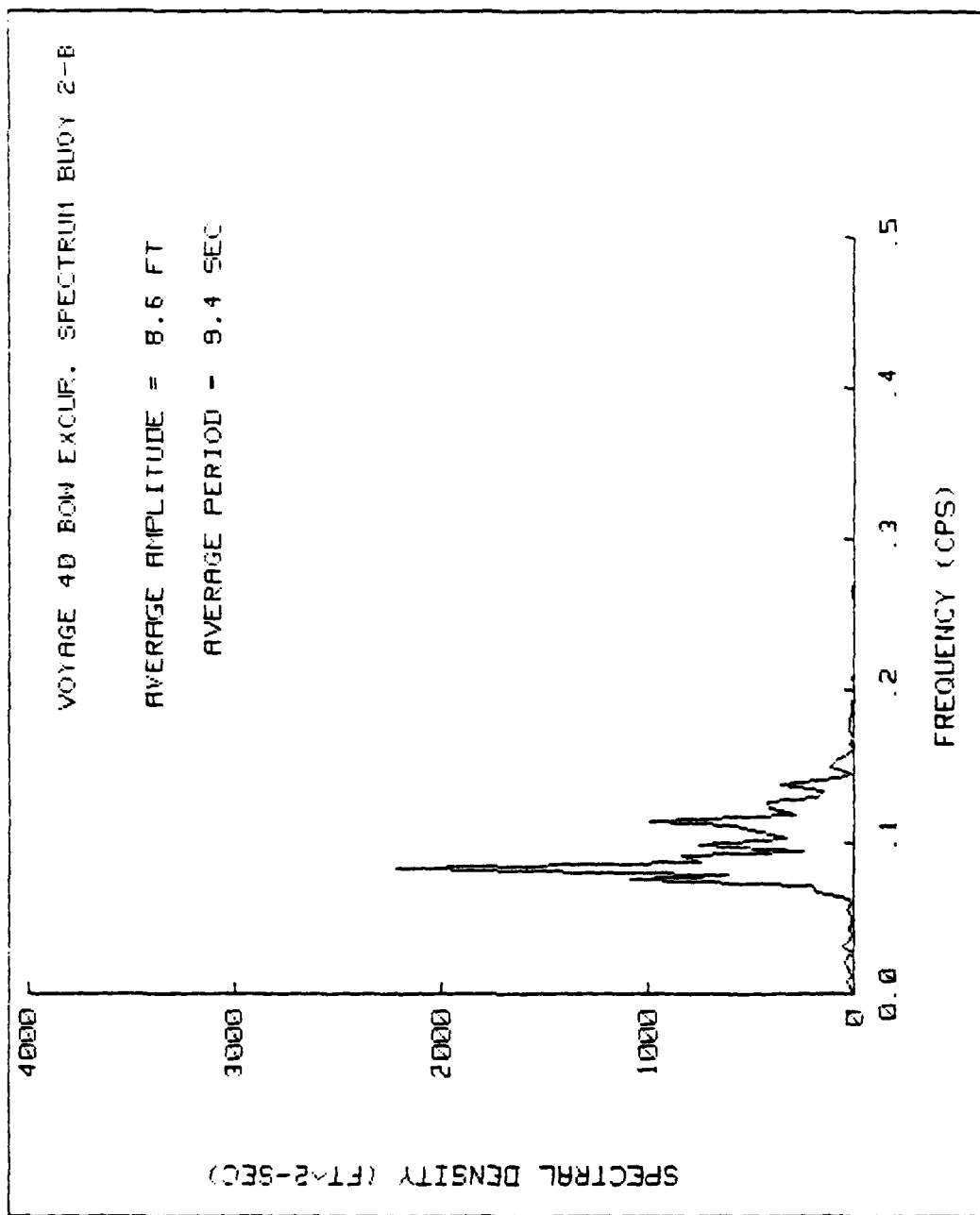
VOYAGE 40 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 1.1 DEG

AVERAGE PERIOD = 9.5 SEC



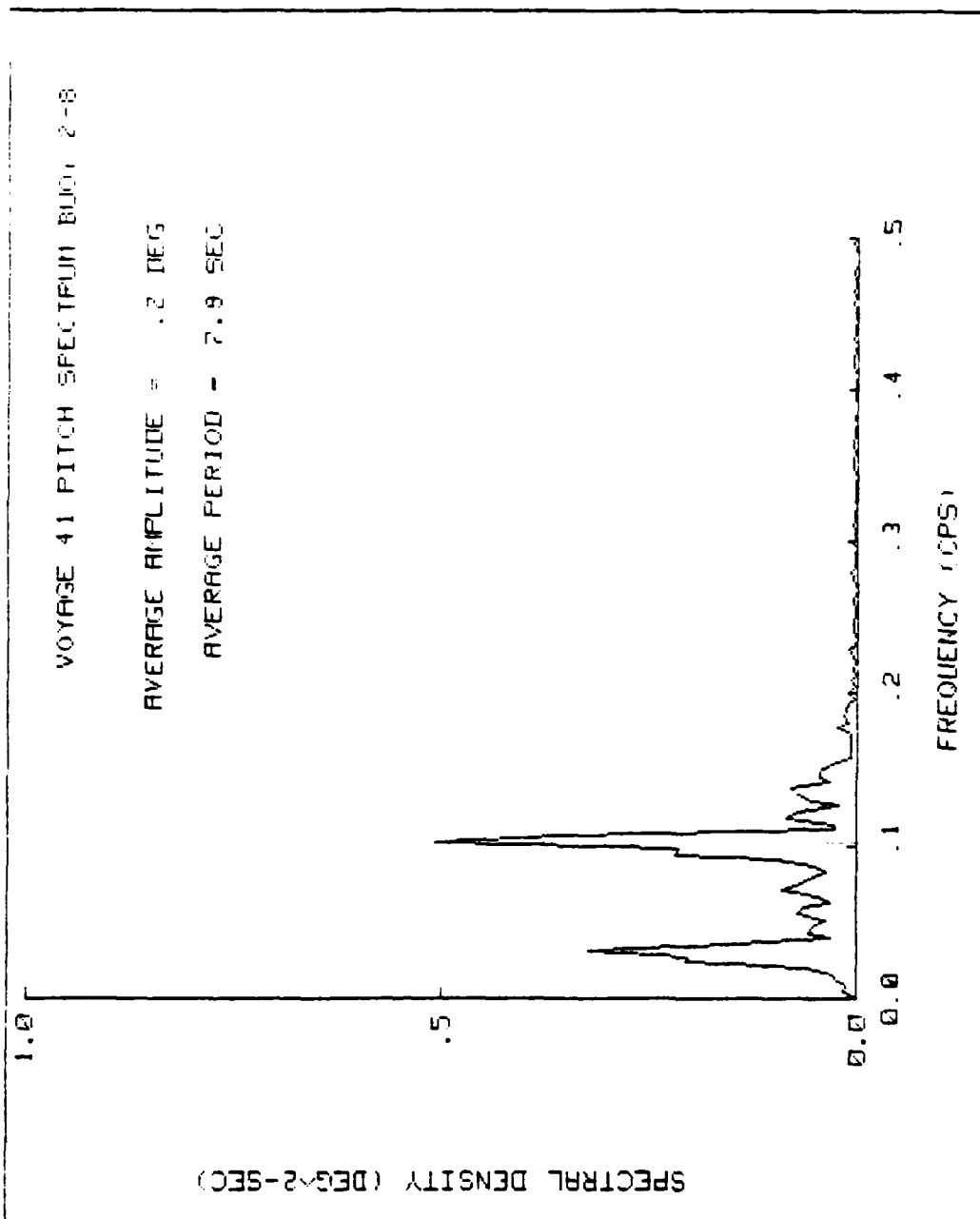


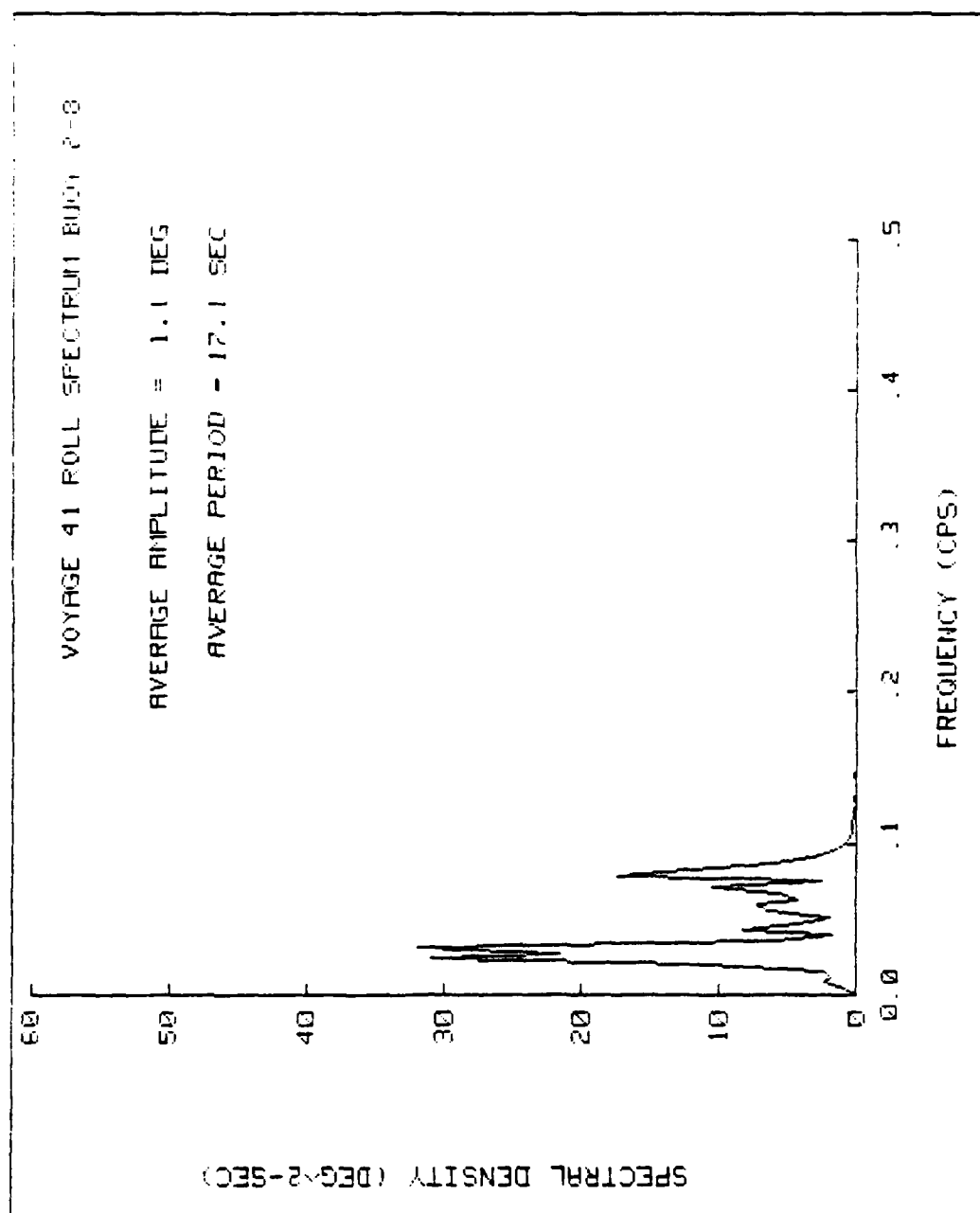


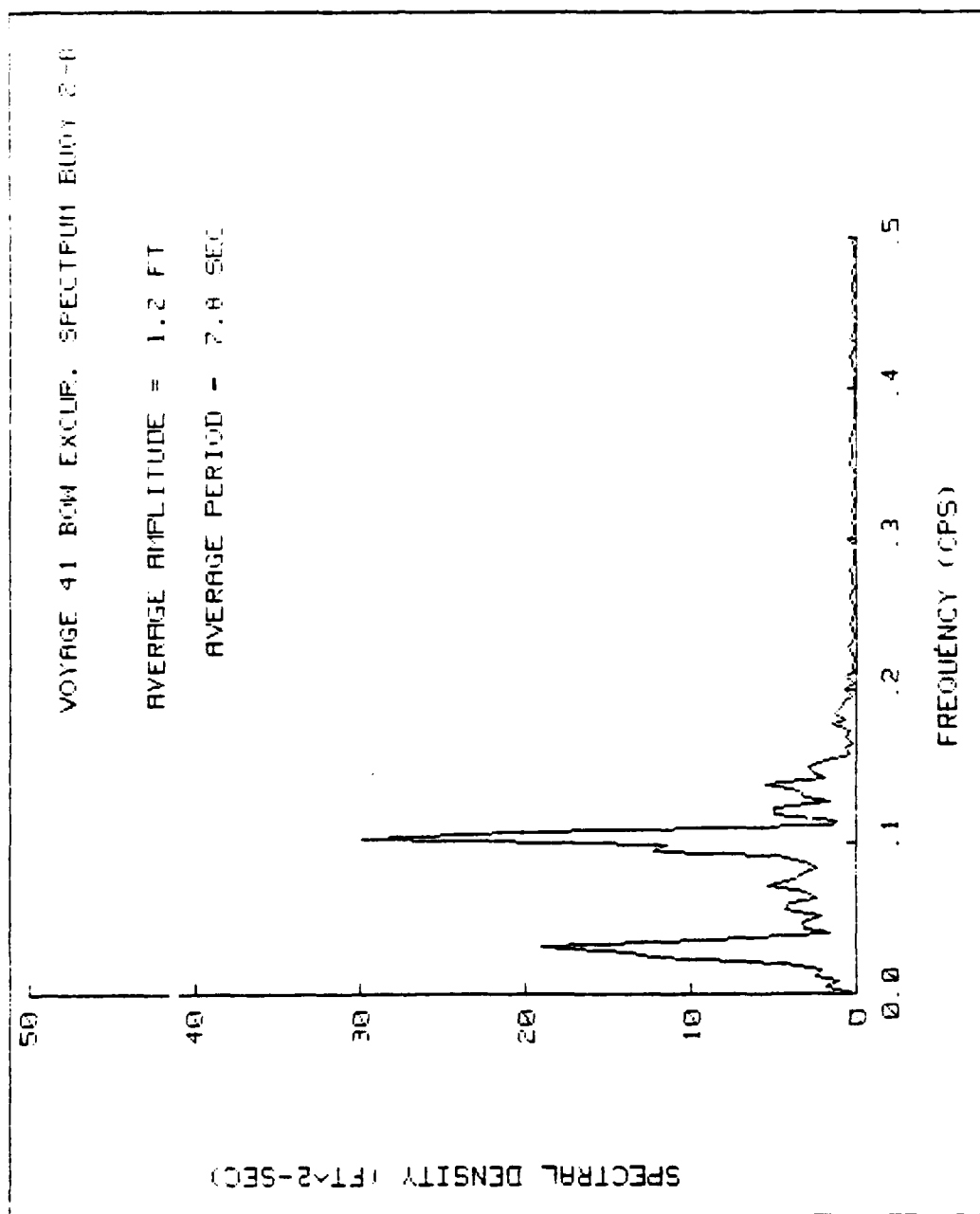
VOYAGE 41 PITCH SPECTRUM BUOY 2-8

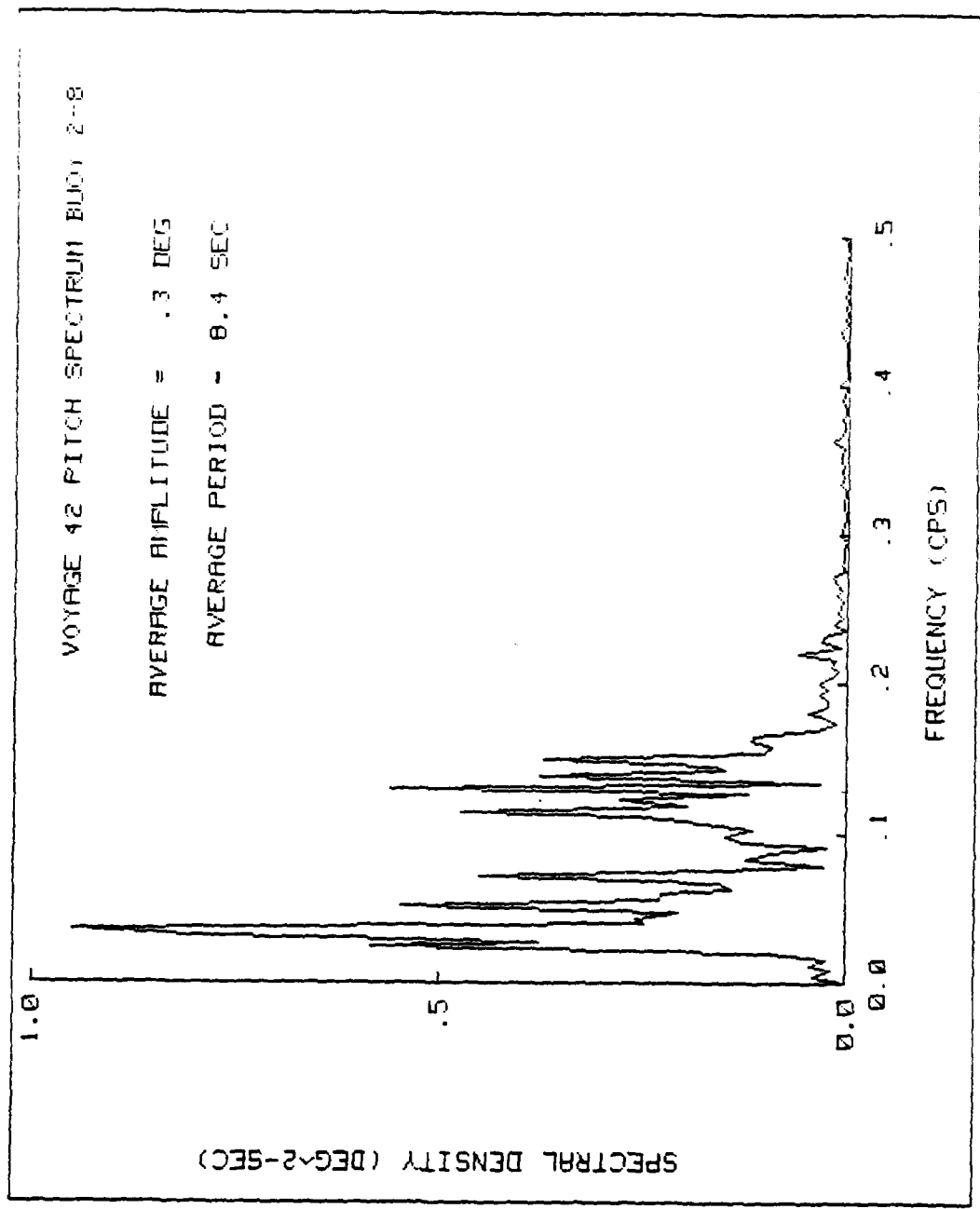
AVERAGE AMPLITUDE = .2 DEG

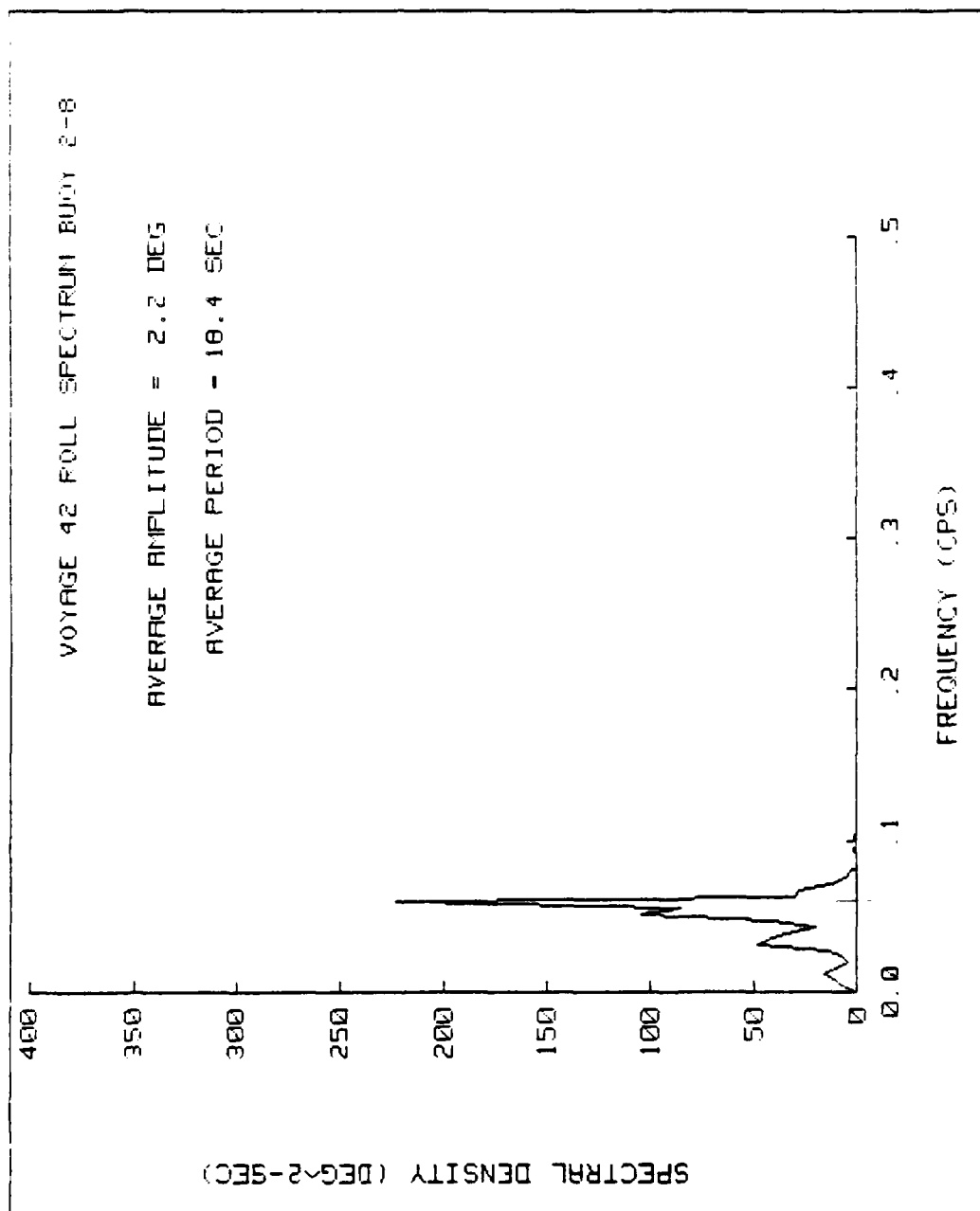
AVERAGE PERIOD = 7.9 SEC

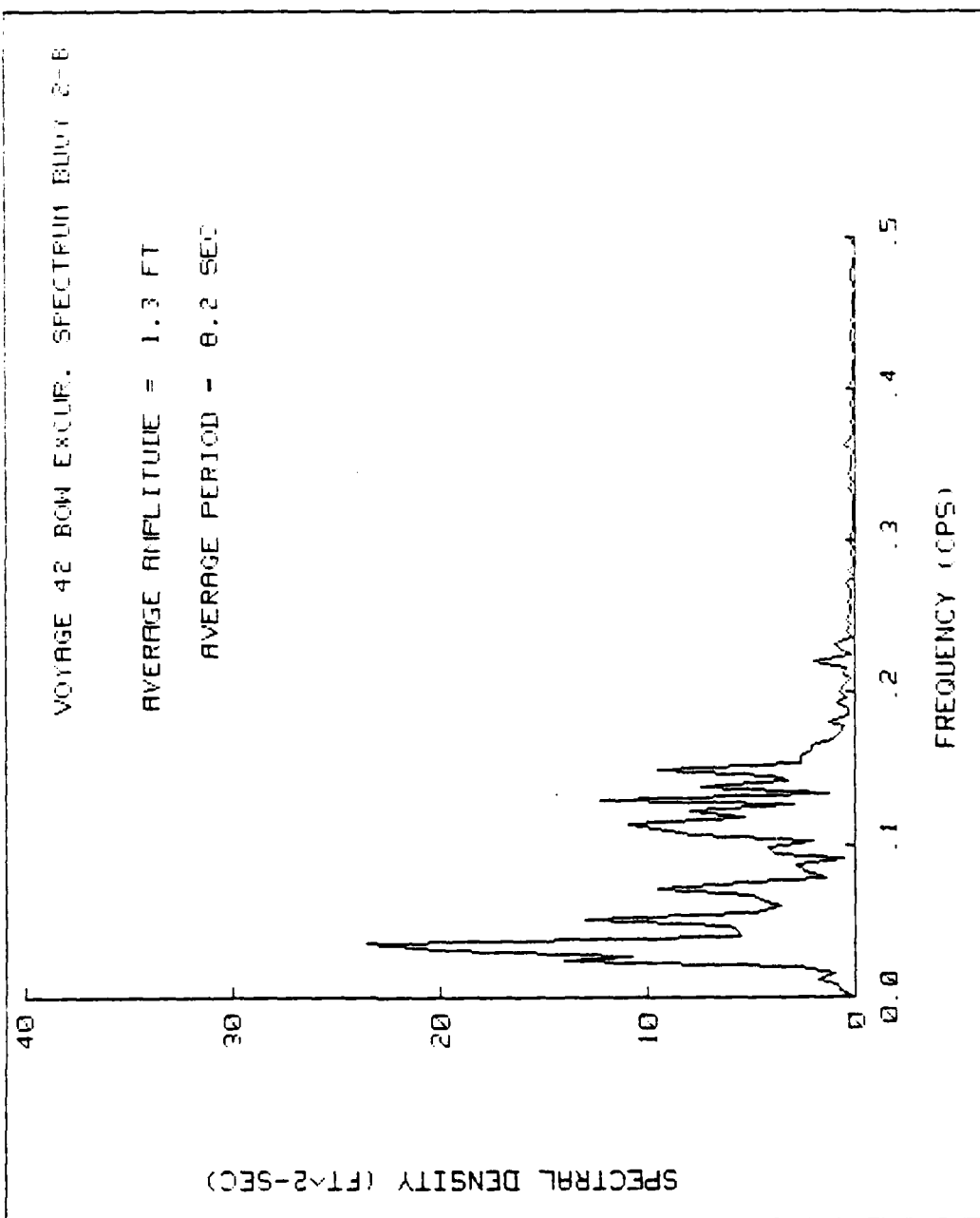








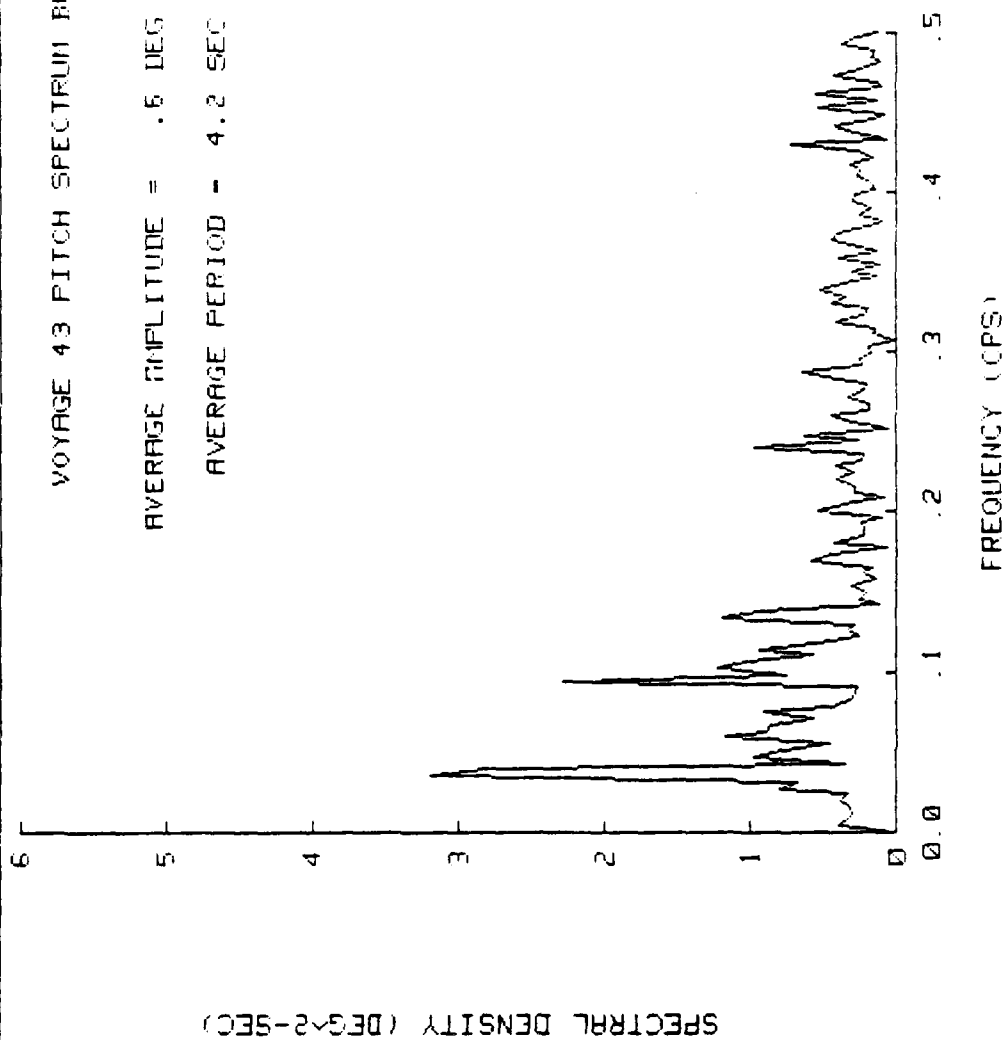


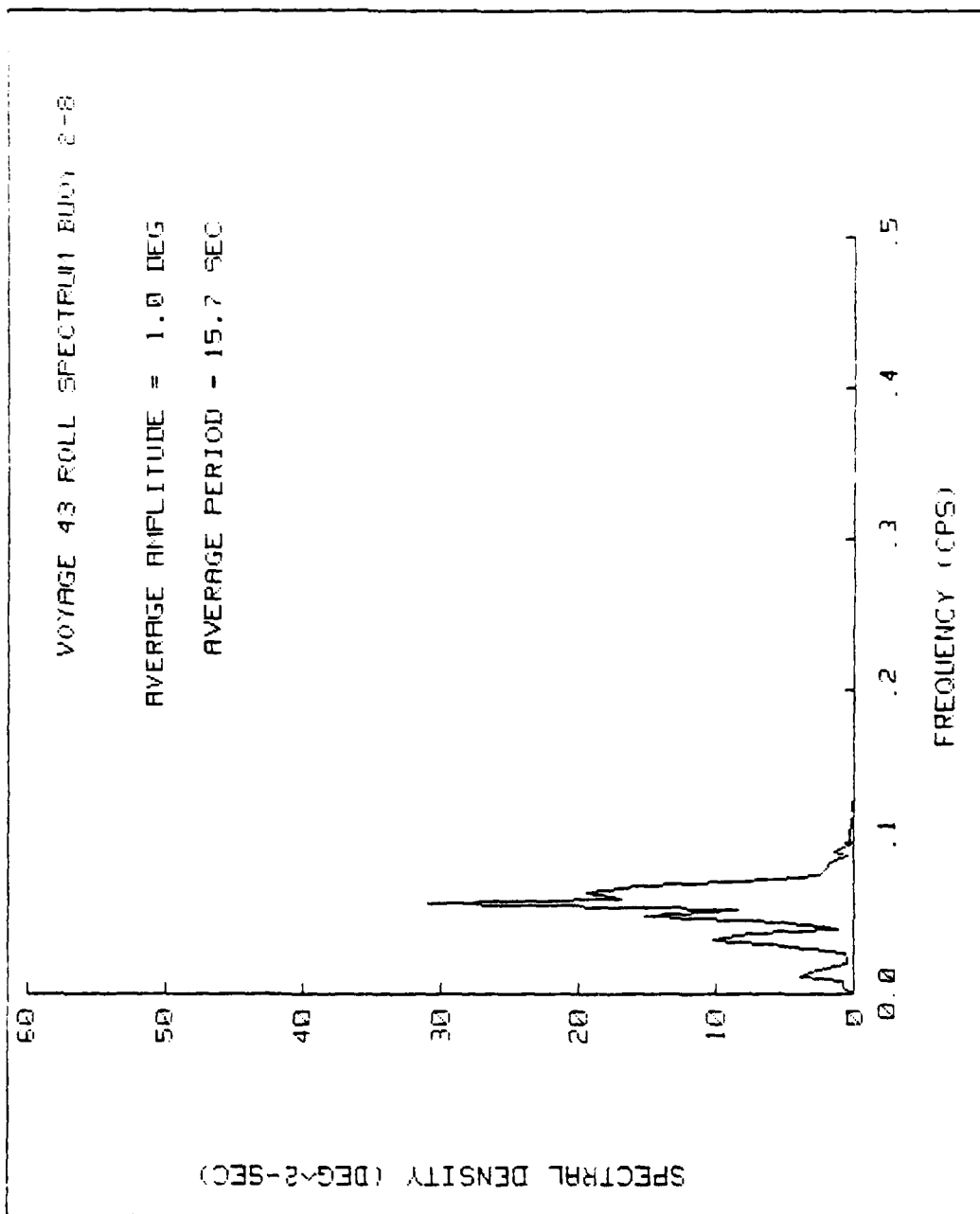


VOYAGE 43 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .6 DEG

AVERAGE PERIOD = 4.2 SEC





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COLUMBIA RIVER ENTRANCE CHANNEL DEEP-DRAFT VESSEL MOTION STUDY.--ETC(U)

SEP 80 S WANG, M KIMBLE, C BUTCHER, G D COX

DACW57-78-C-0028

UNCLASSIFIED

TETRAT-TC-3925-APP-B-K

NL

3 of 3

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1989-6

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DATE

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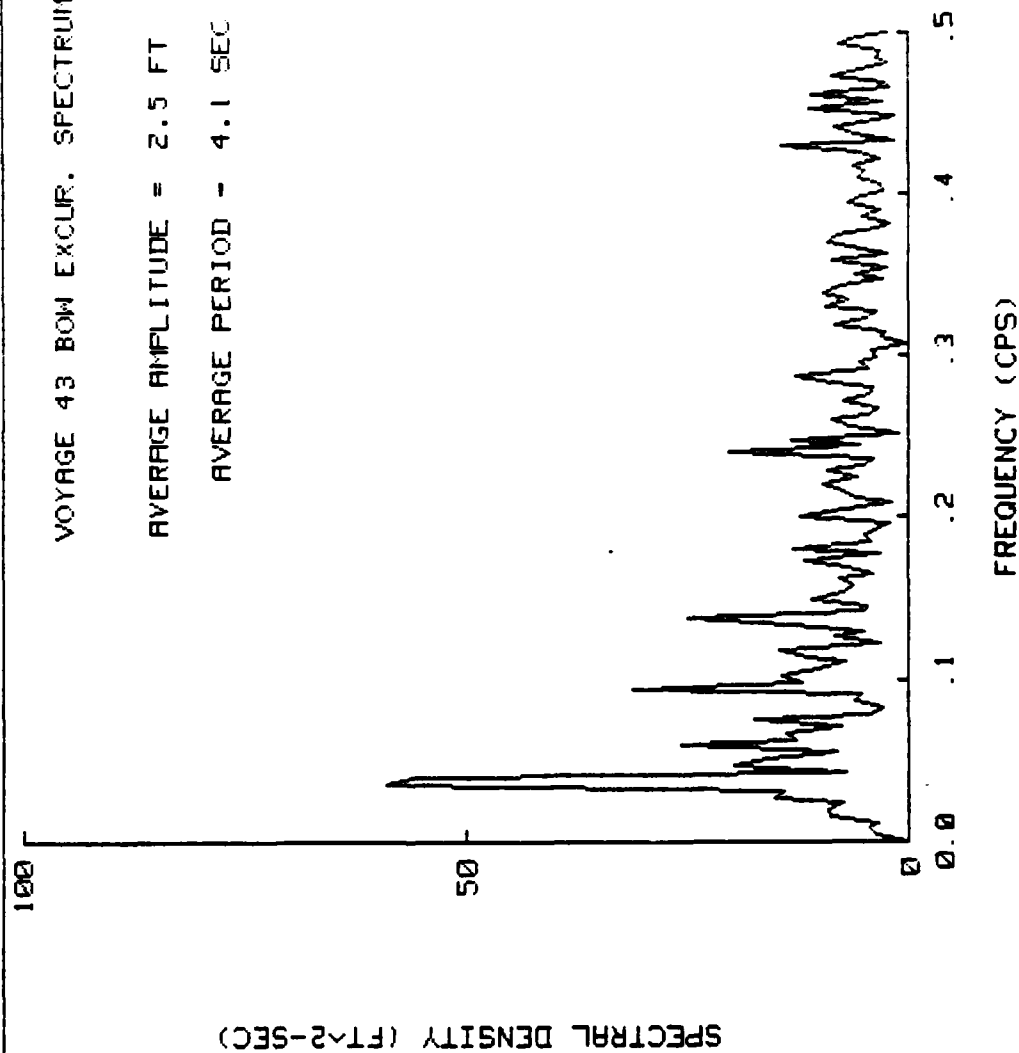
6-81

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VOYAGE 43 BOW EXCUR. SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 2.5 FT

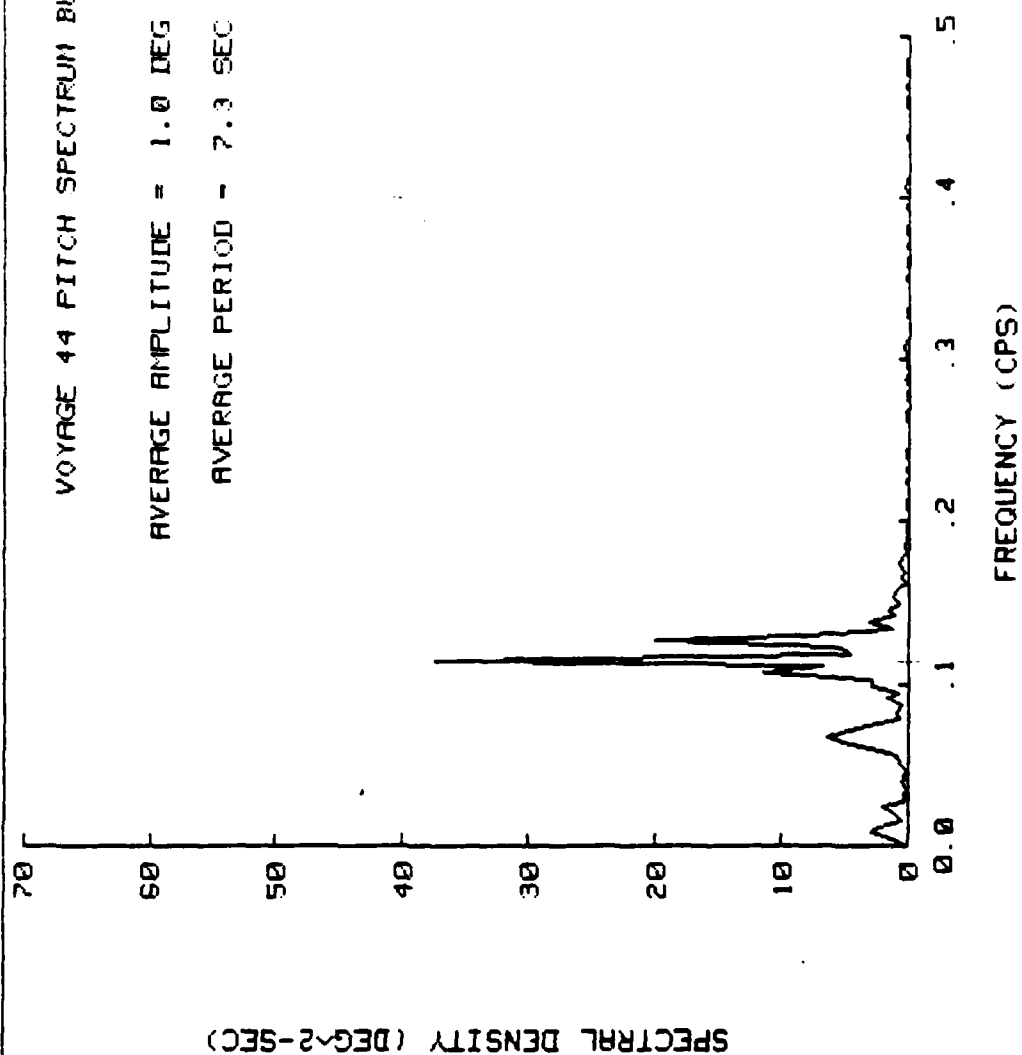
AVERAGE PERIOD = 4.1 SEC

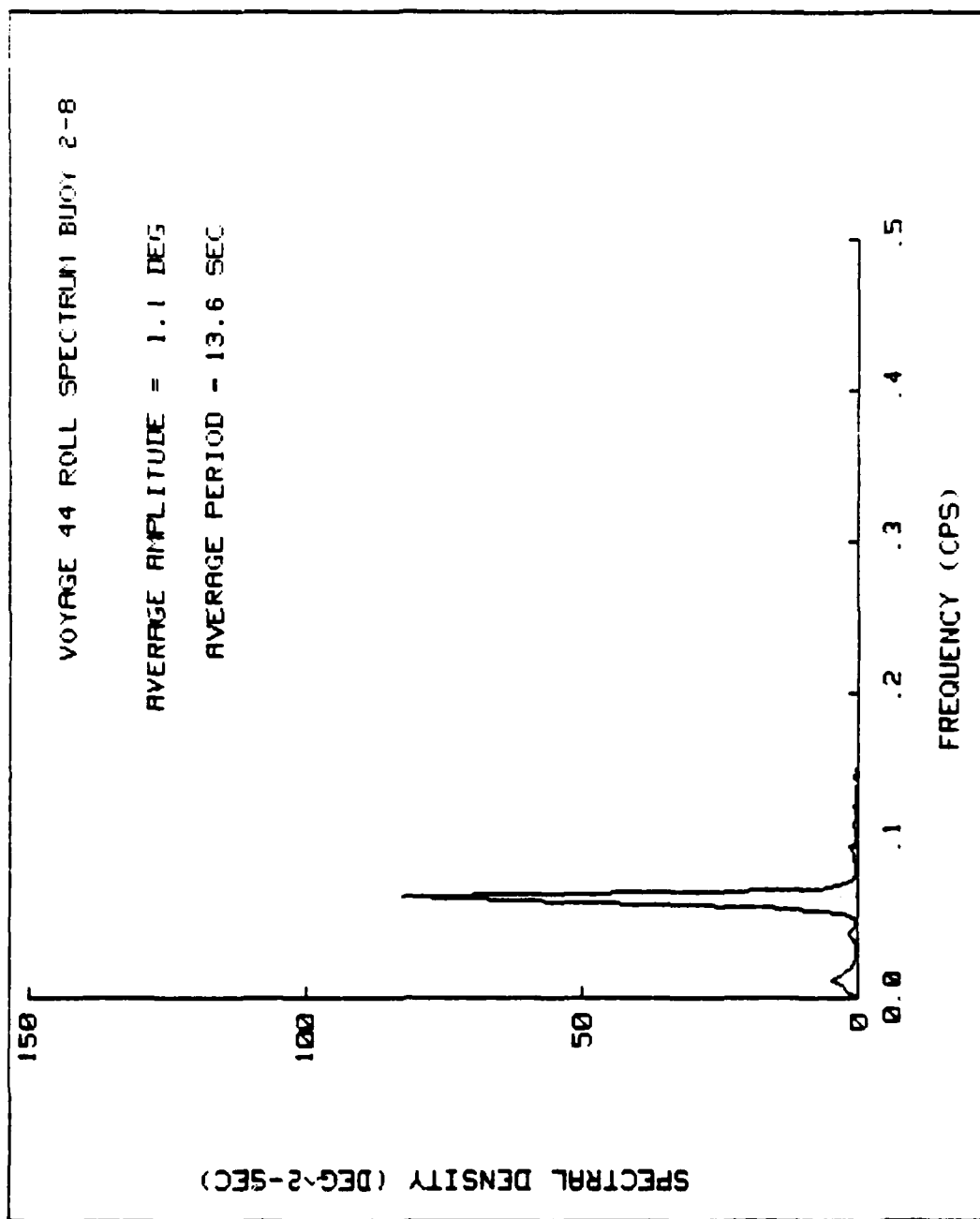


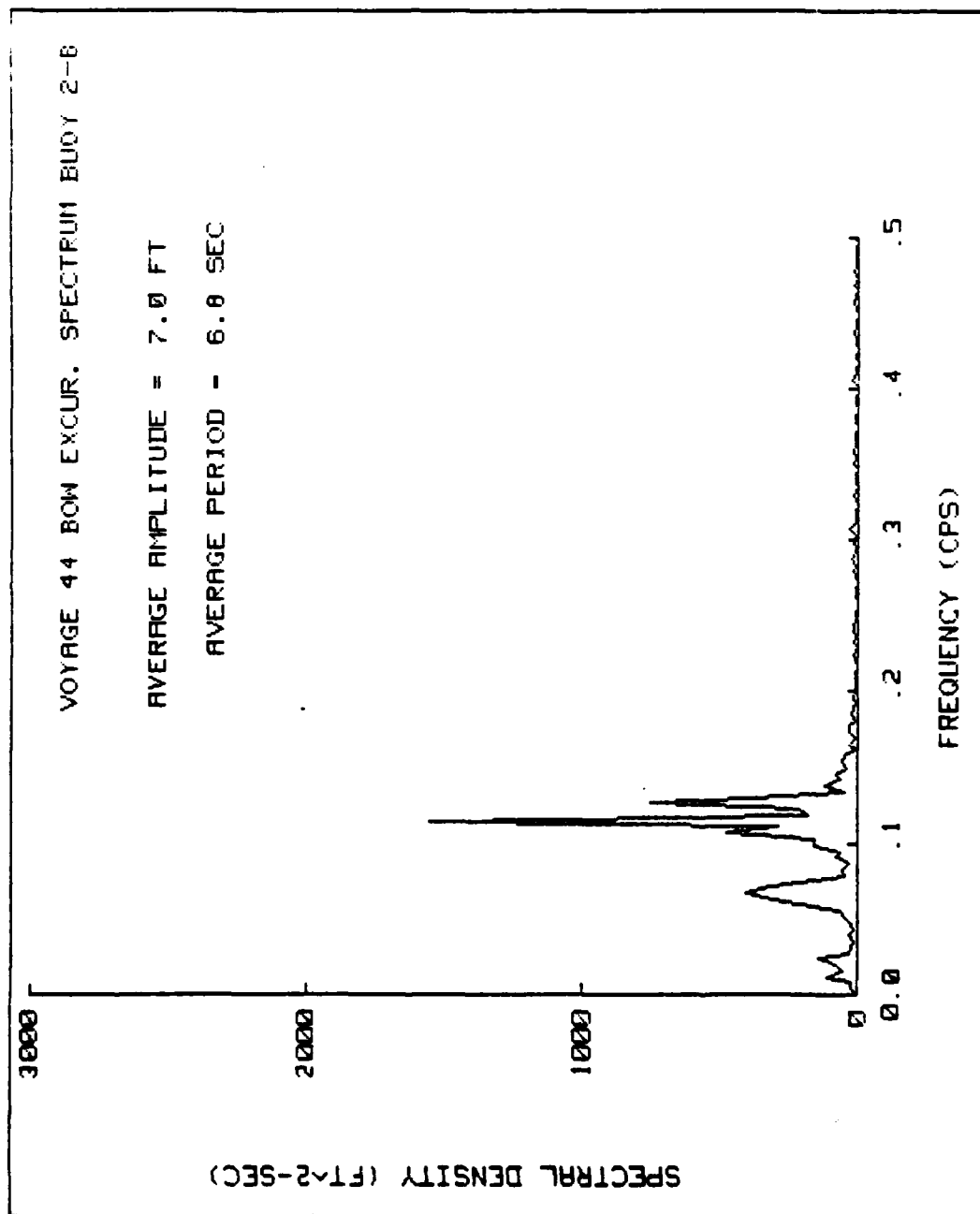
VOYAGE 44 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 1.0 DEG

AVERAGE PERIOD = 7.3 SEC



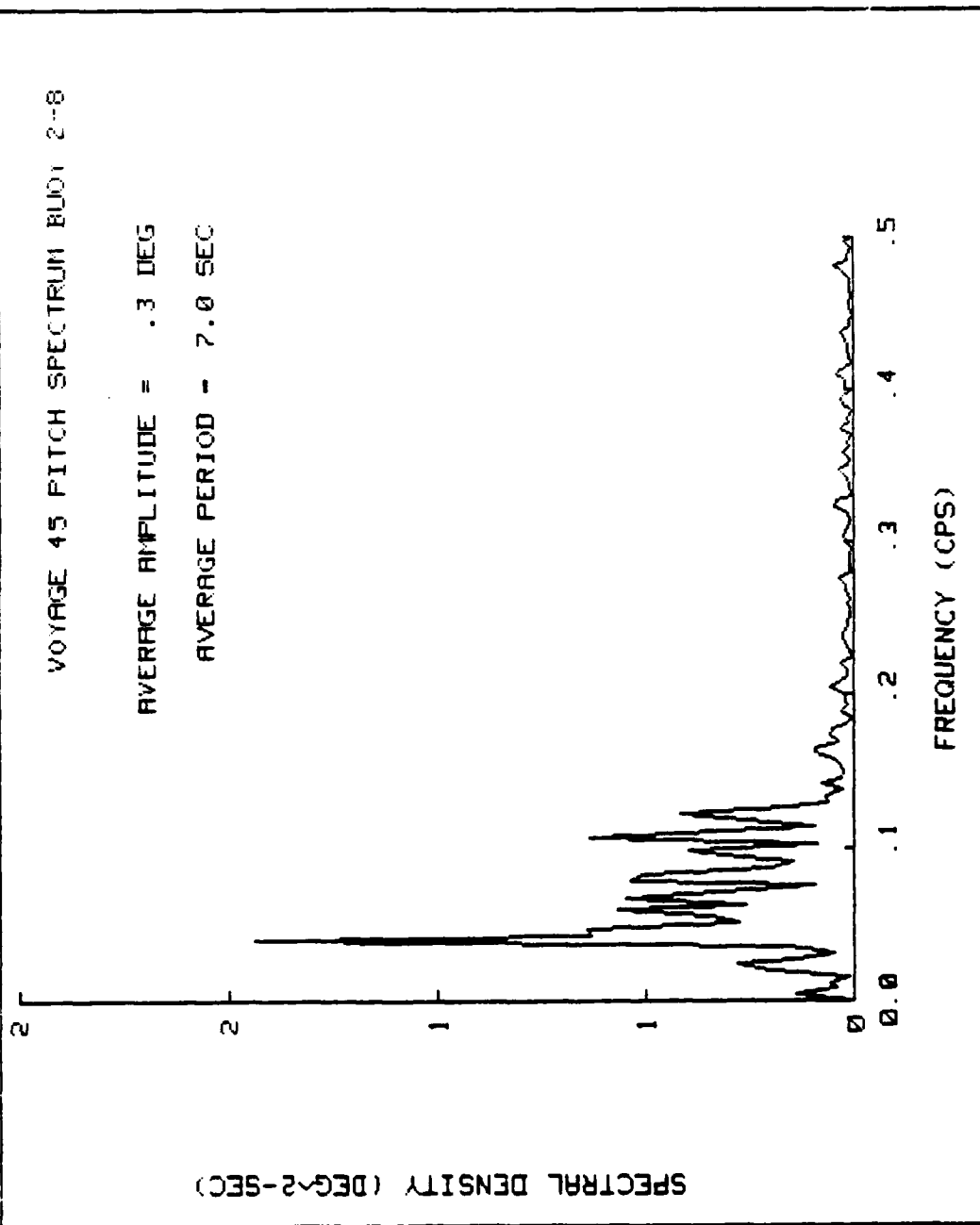


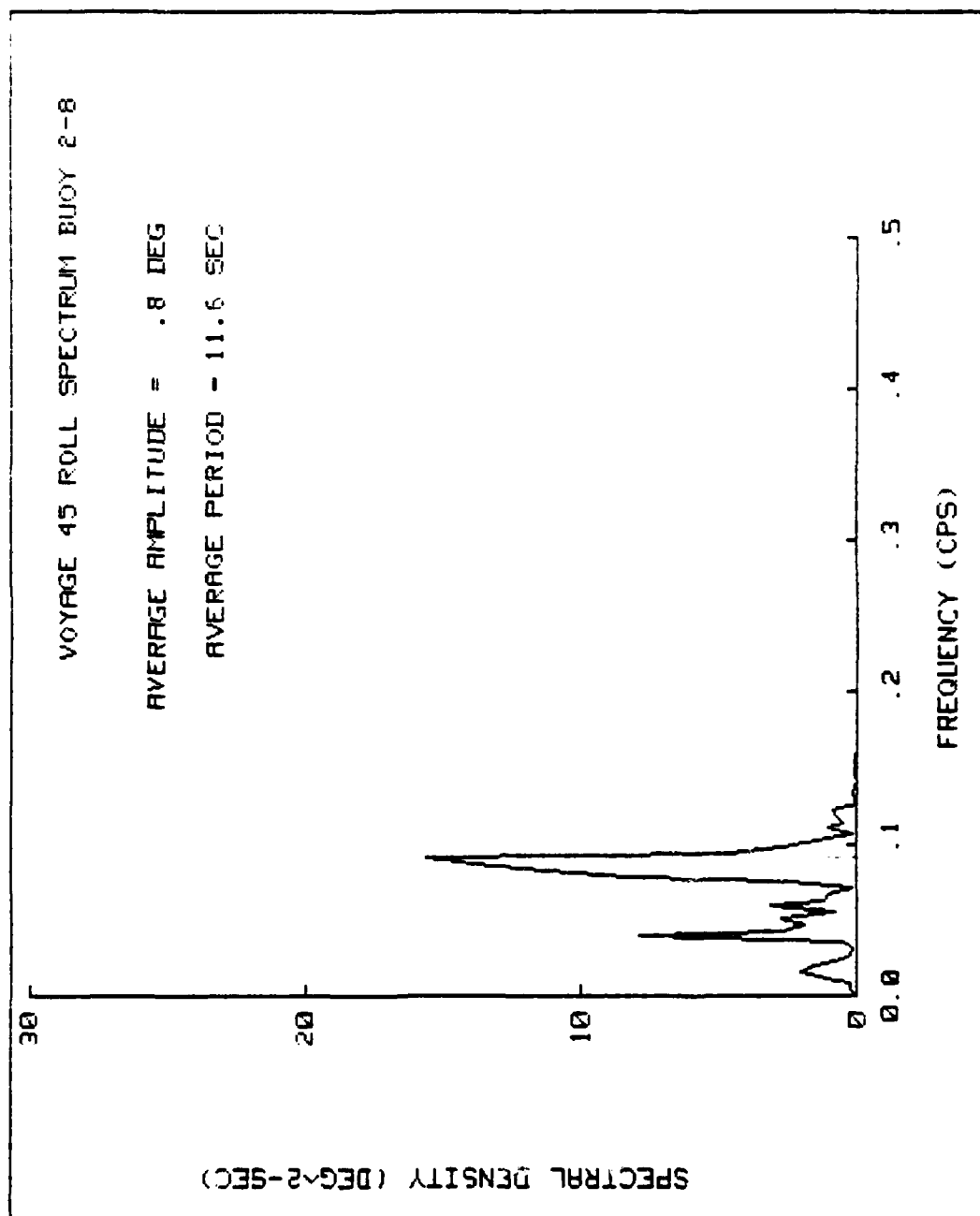


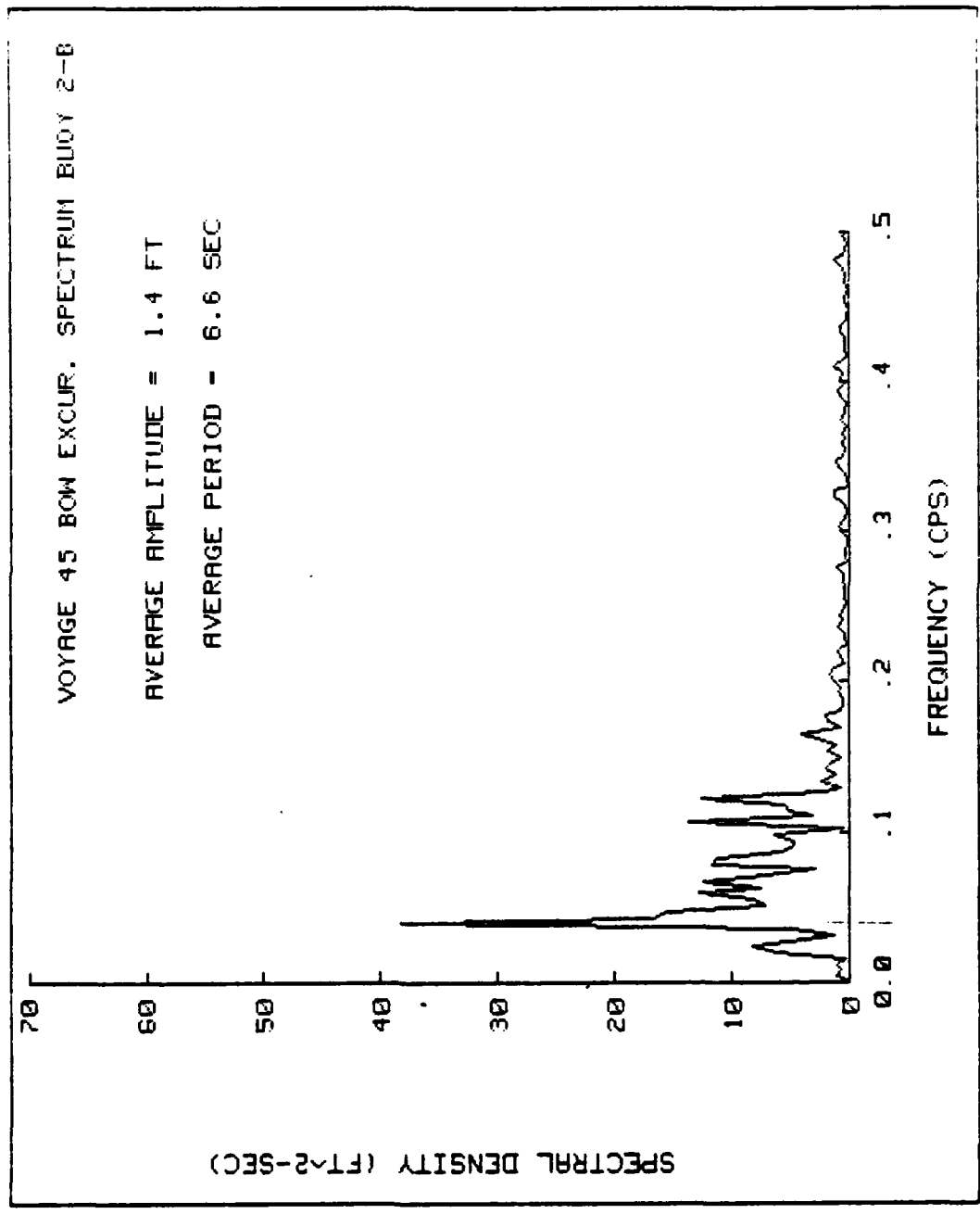
VOYAGE 45 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .3 DEG

AVERAGE PERIOD - 7.0 SEC



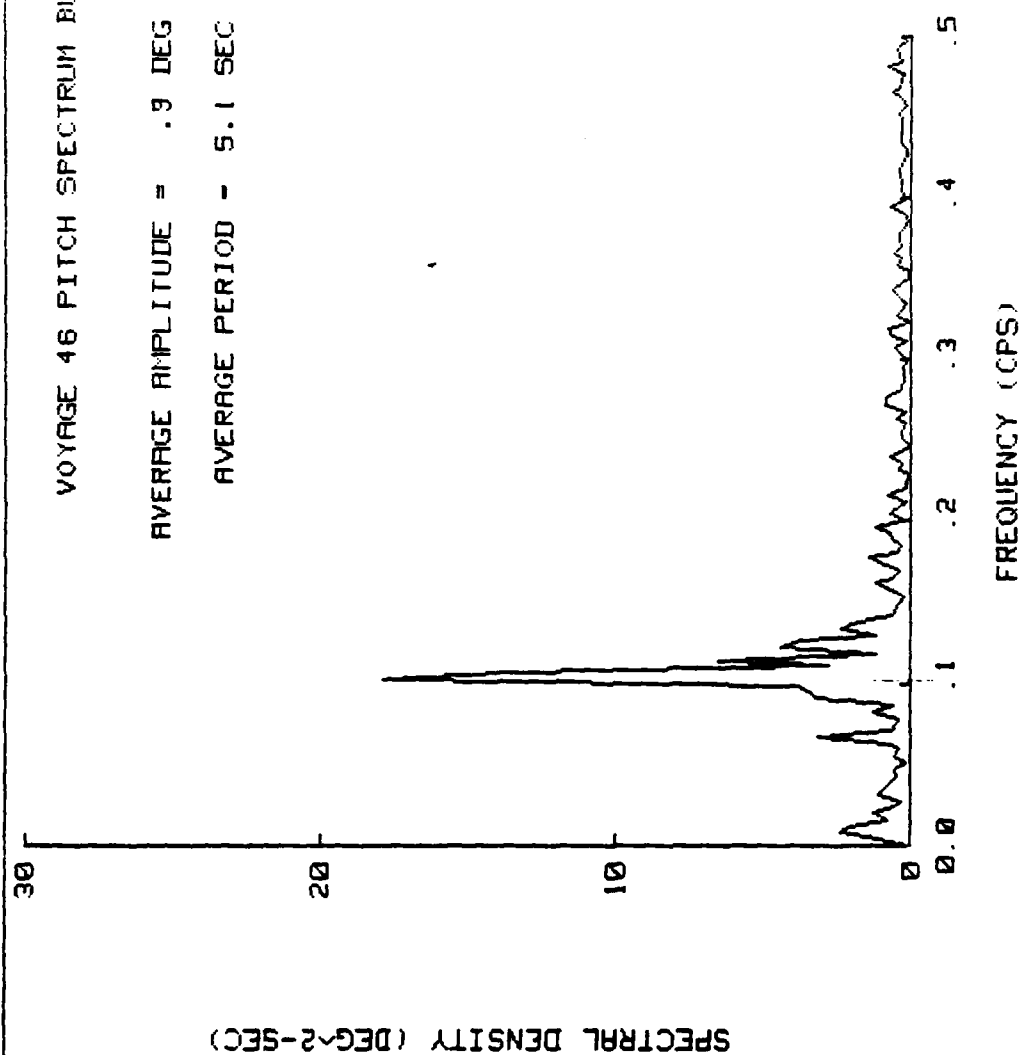




VOYAGE 46 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .9 DEG

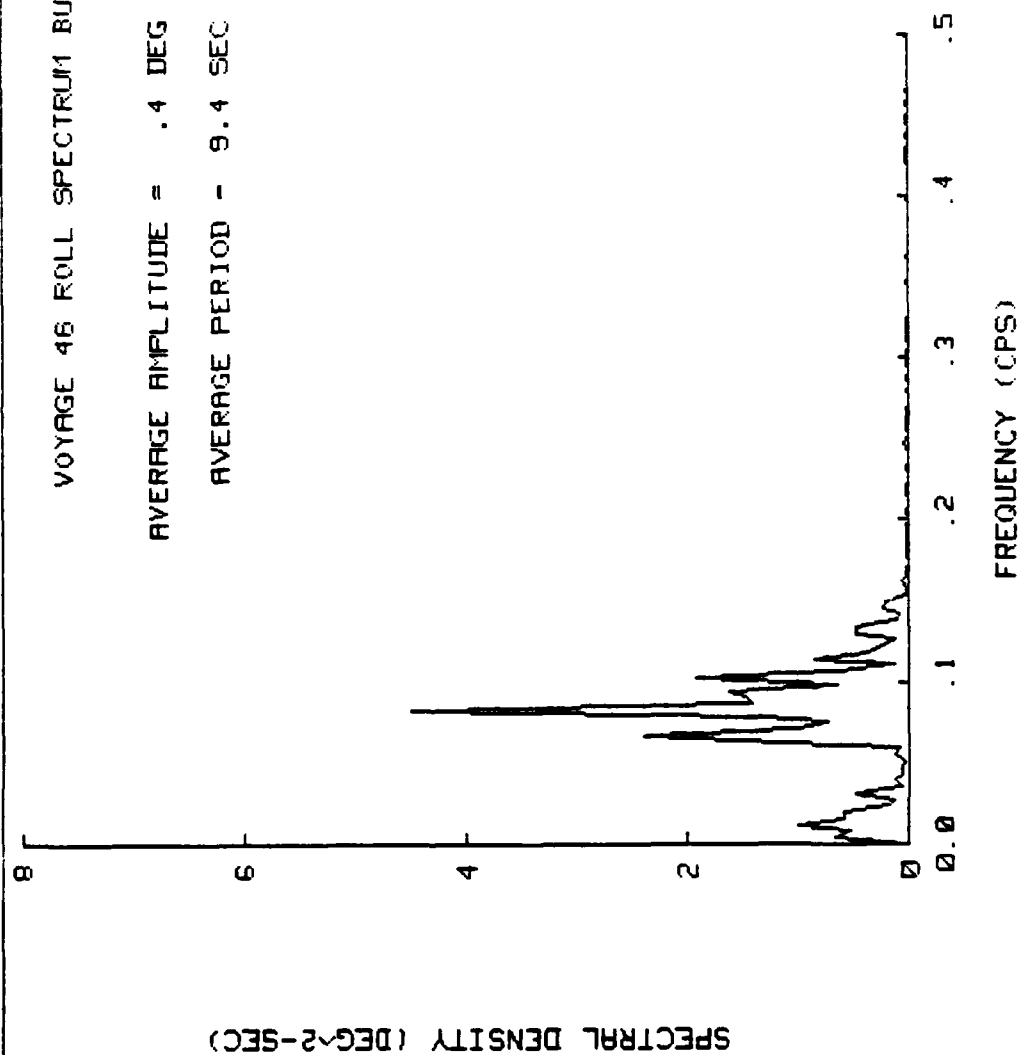
AVERAGE PERIOD = 5.1 SEC

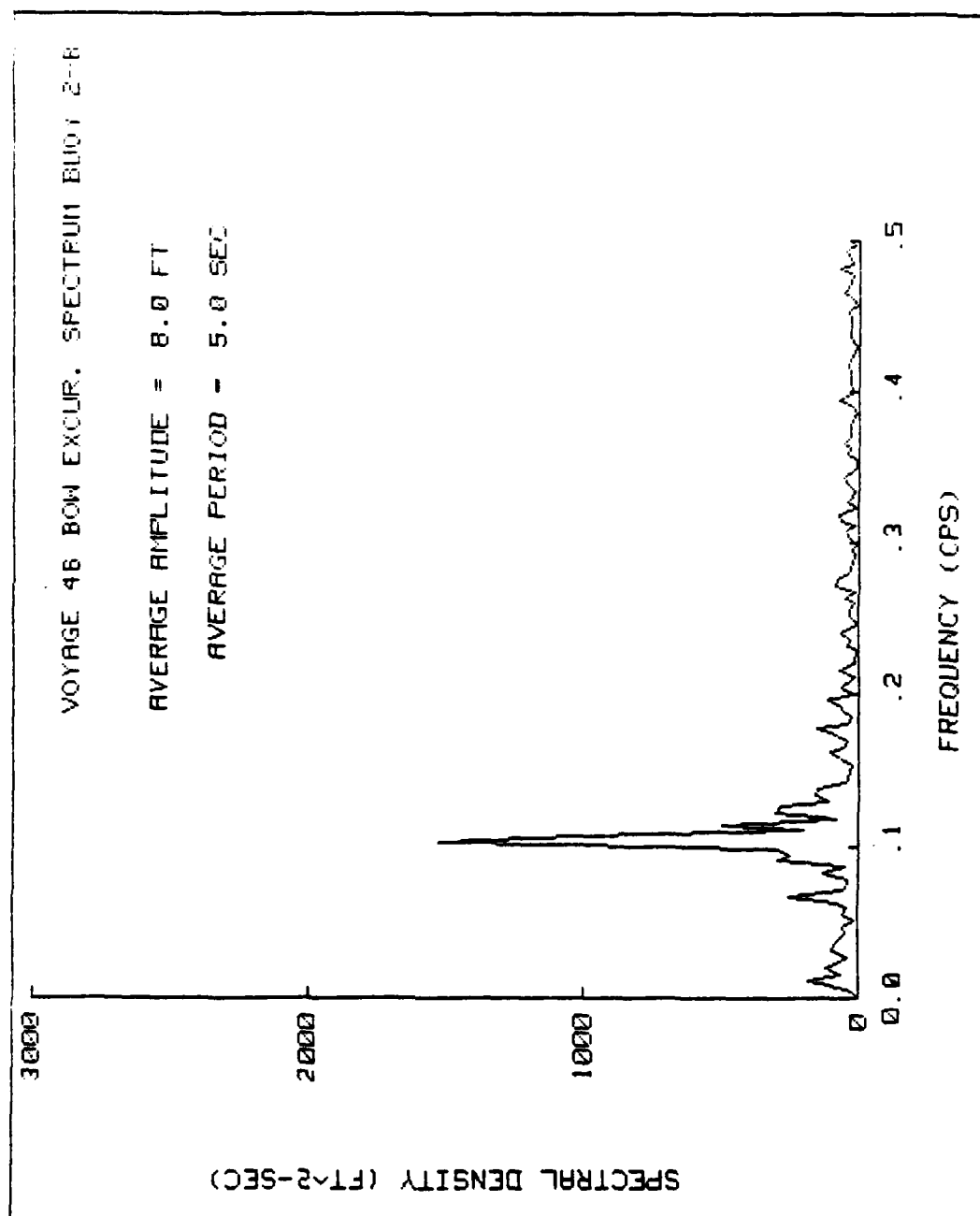


VOYAGE 46 ROLL SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .4 DEG

AVERAGE PERIOD = 9.4 SEC

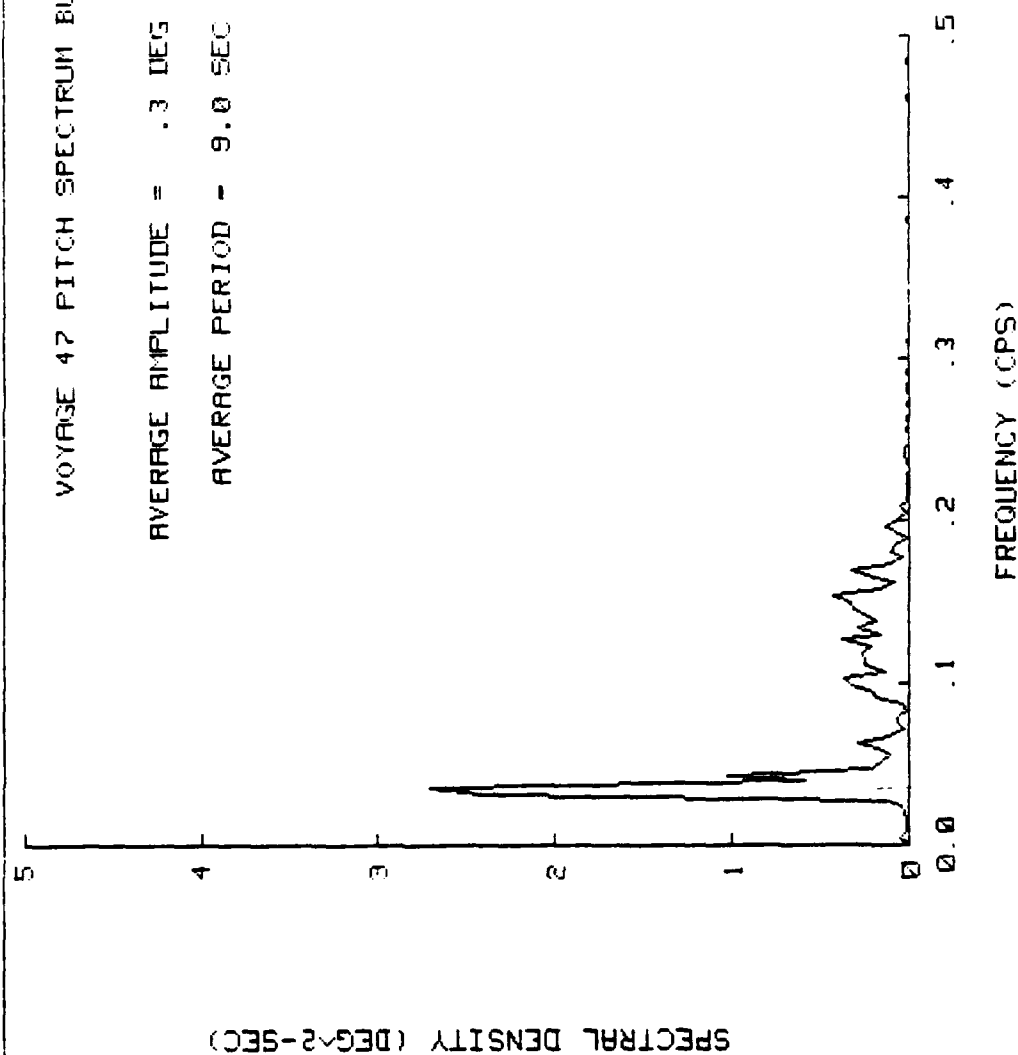


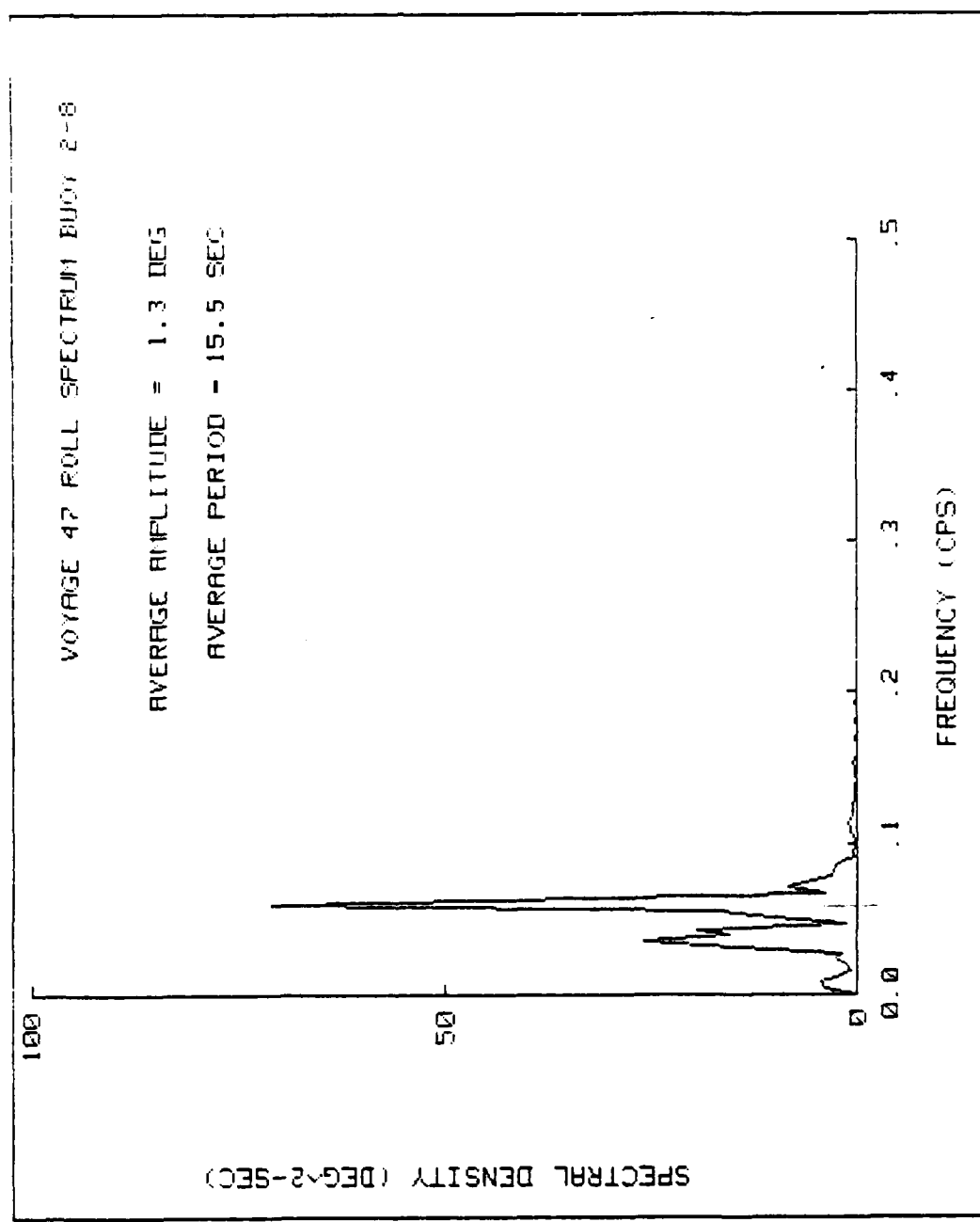


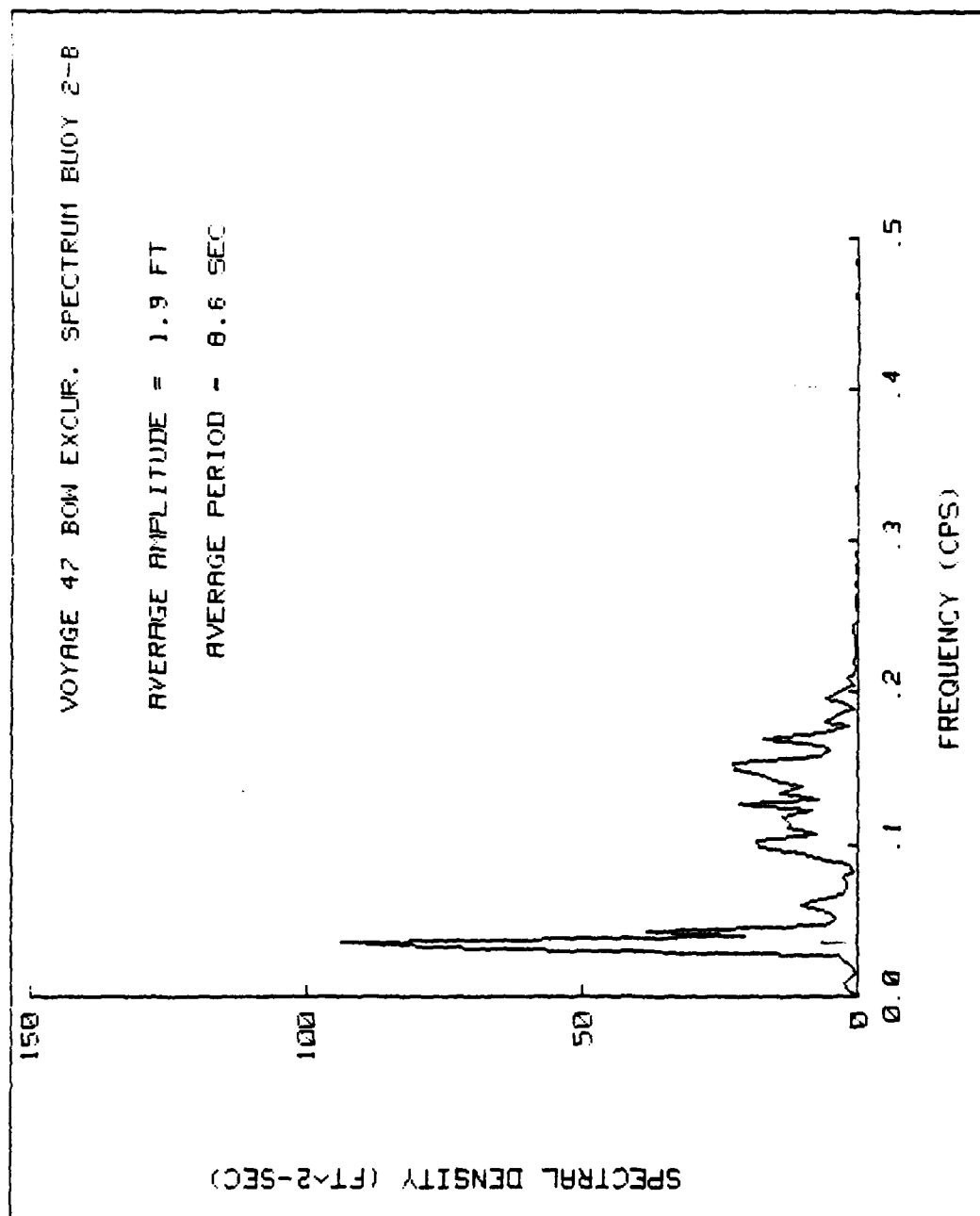
VOYAGE 47 PITCH SPECTRUM BUOY 2-8

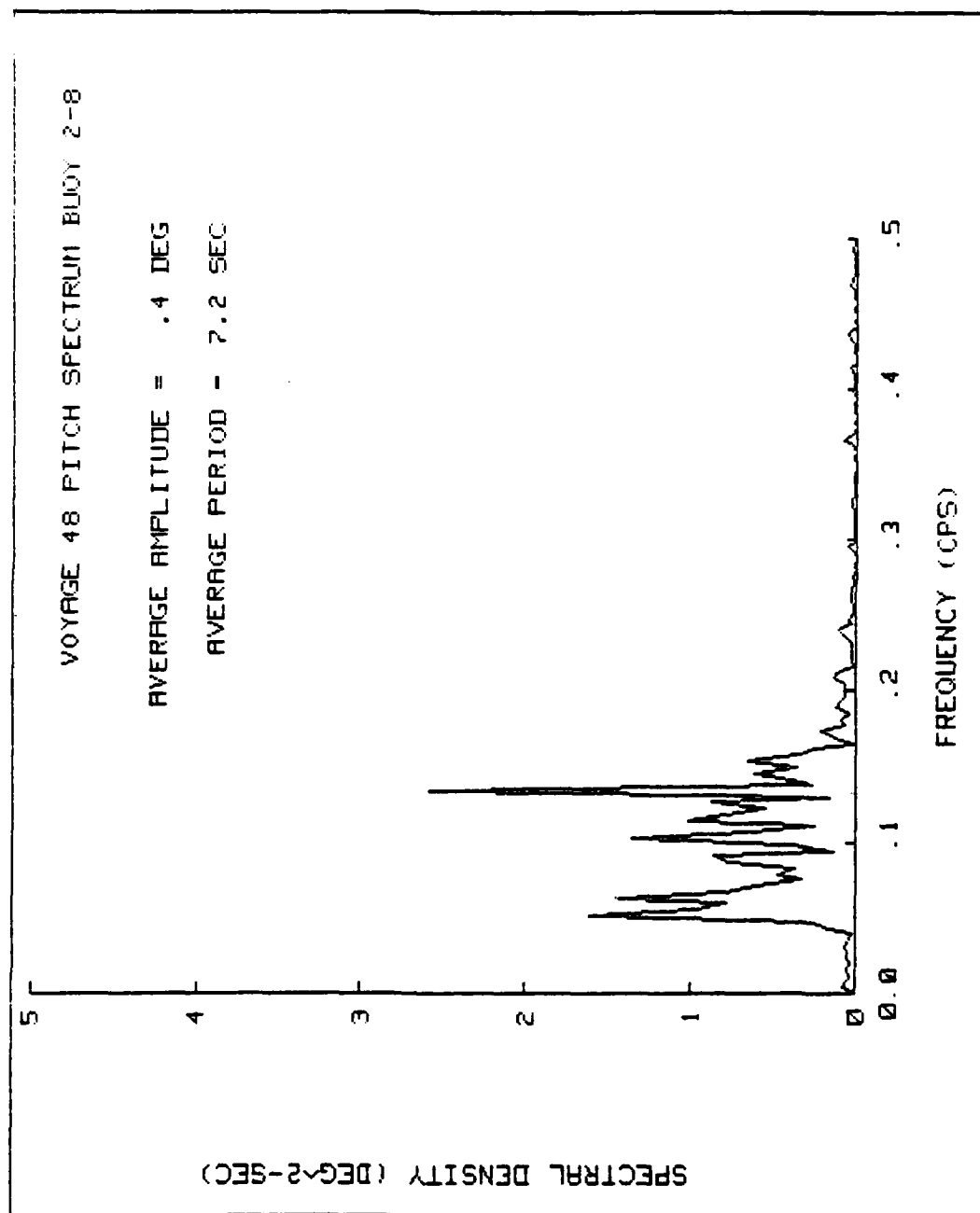
AVERAGE AMPLITUDE = .3 DEG

AVERAGE PERIOD = 9.0 SEC





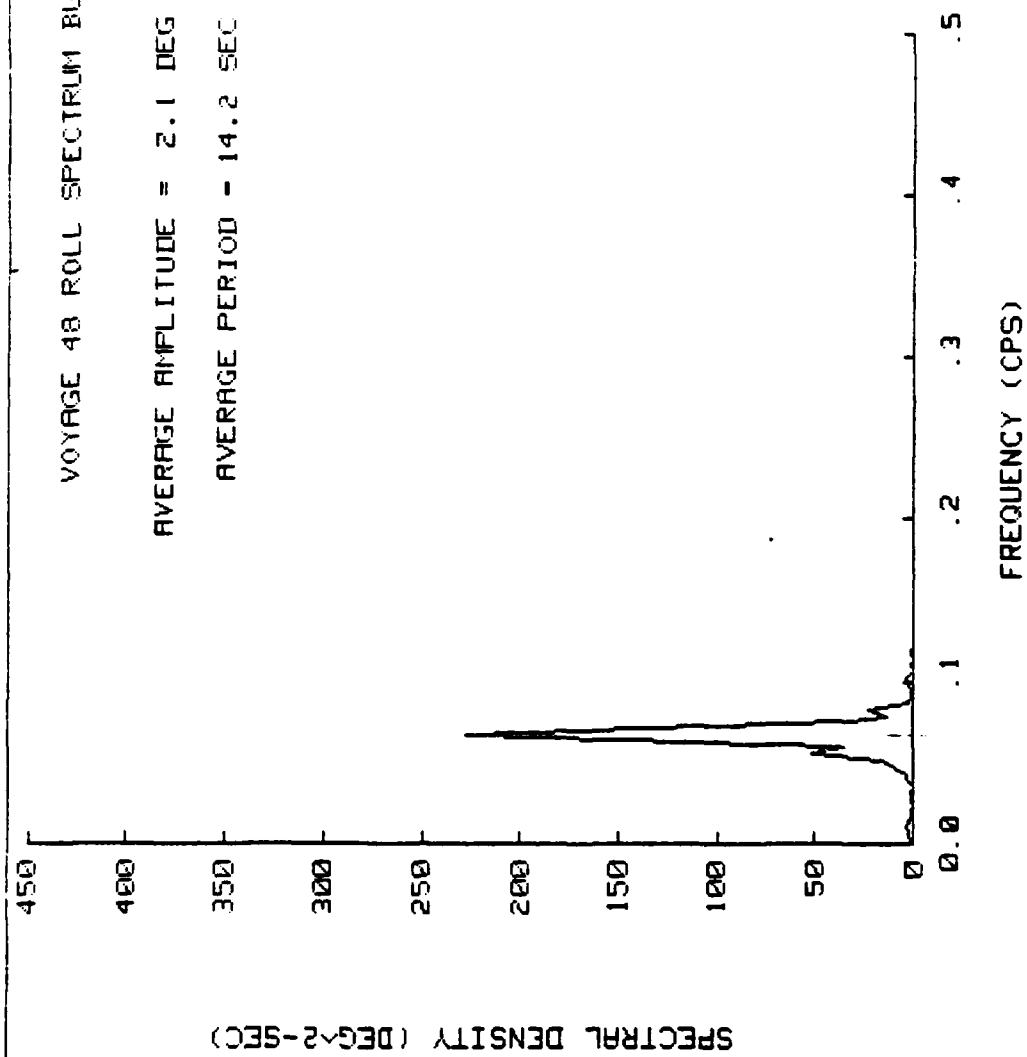


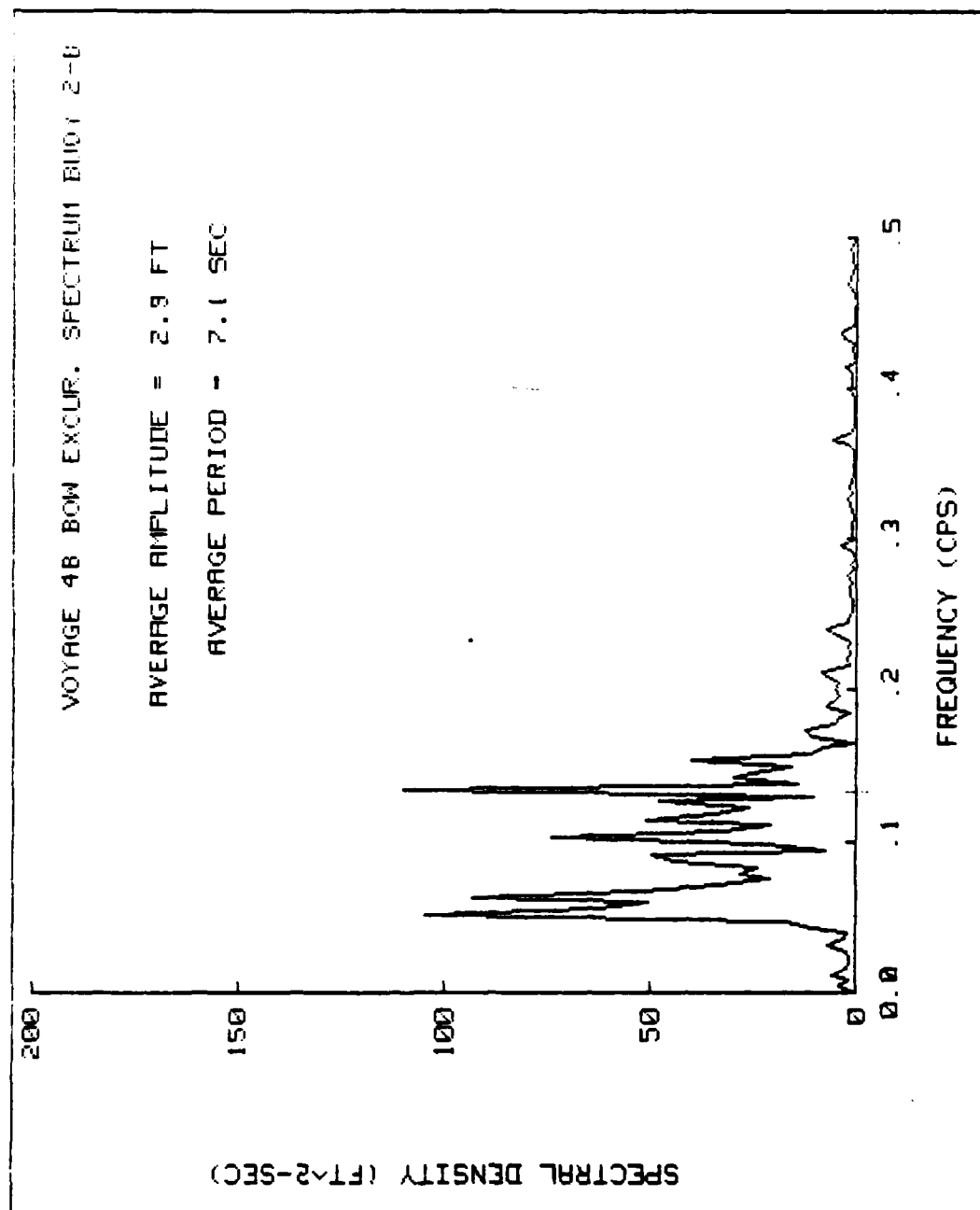


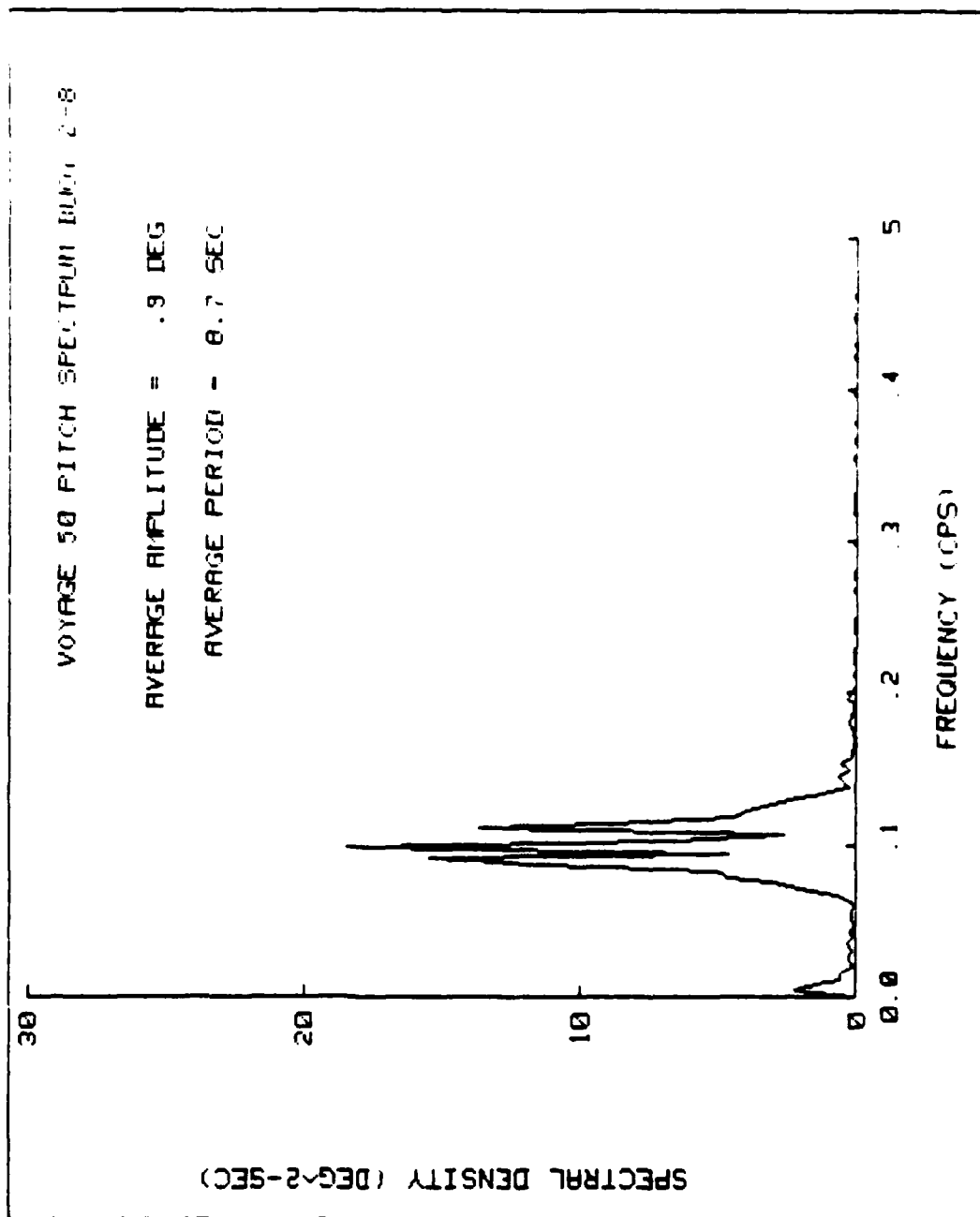
VOYAGE 48 ROLL SPECTRUM BUOY 2-8

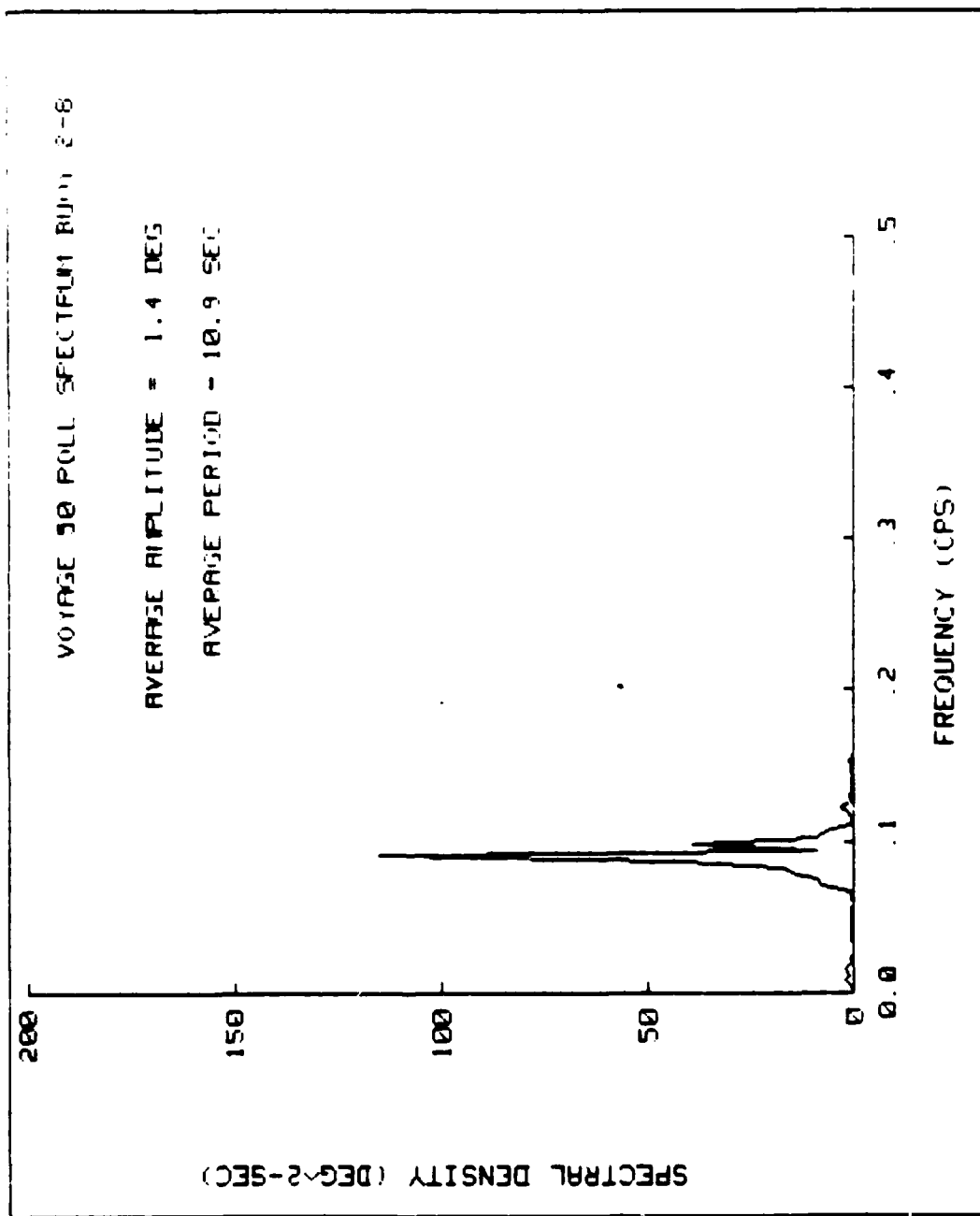
AVERAGE AMPLITUDE = 2.1 DEG

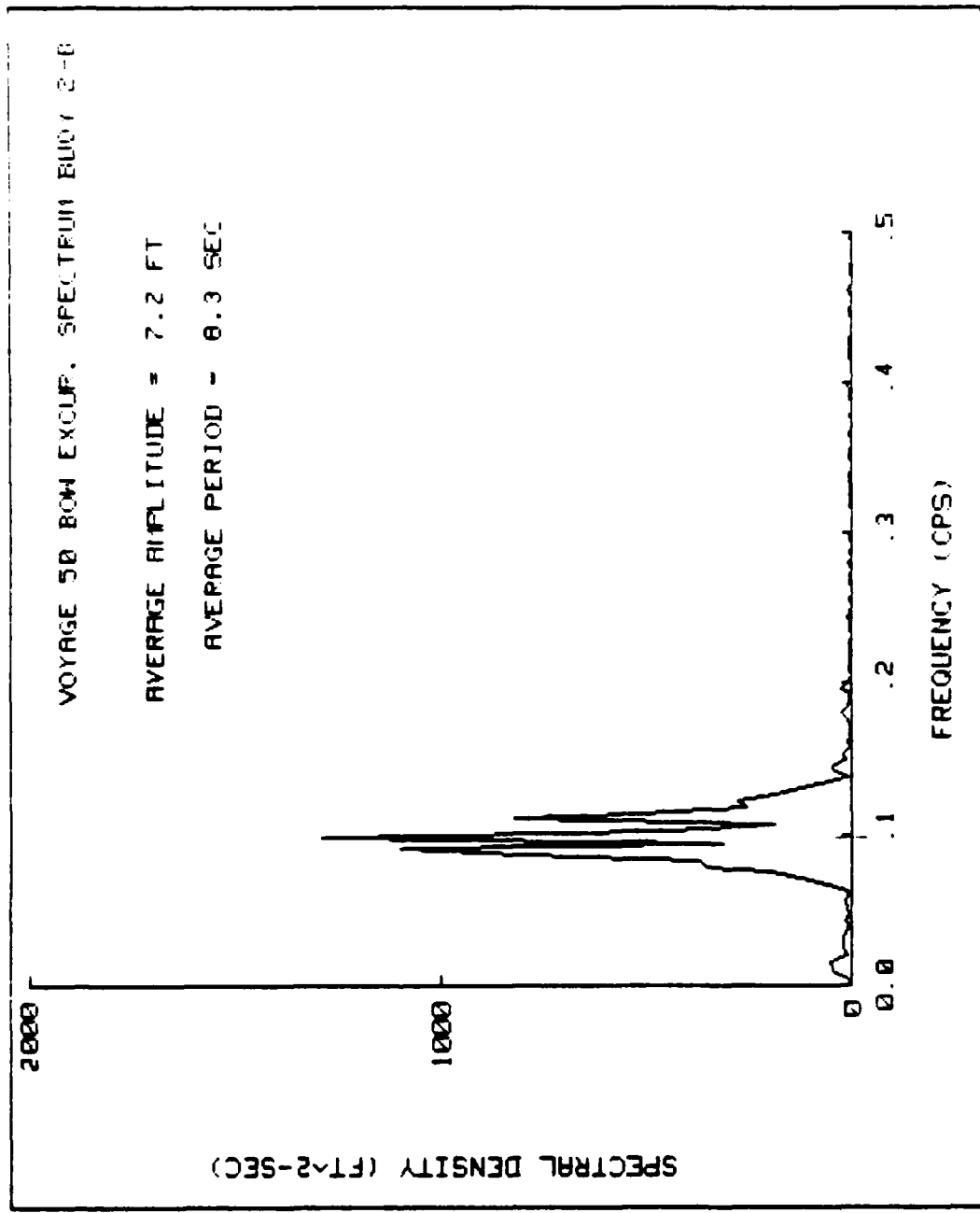
AVERAGE PERIOD = 14.2 SEC







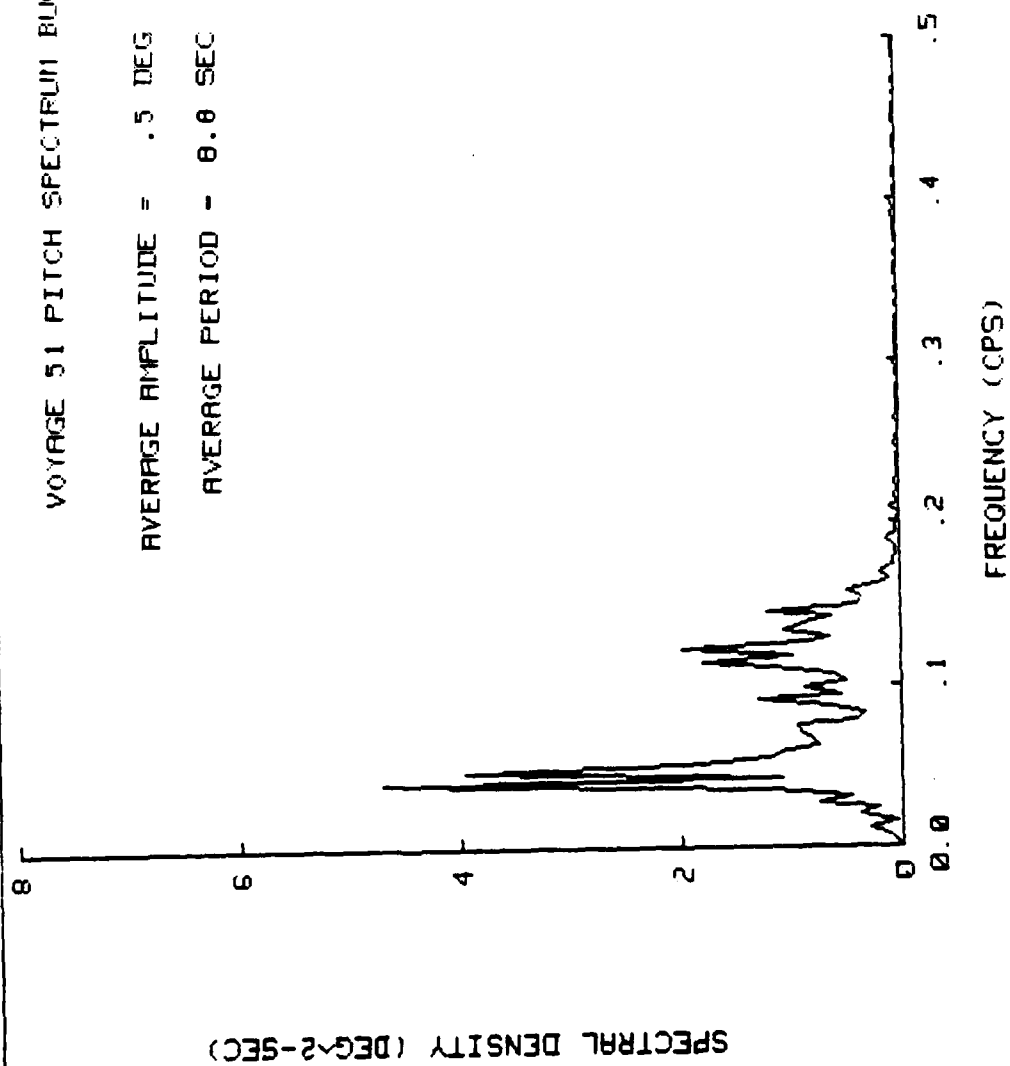




VOYAGE 51 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .5 DEG

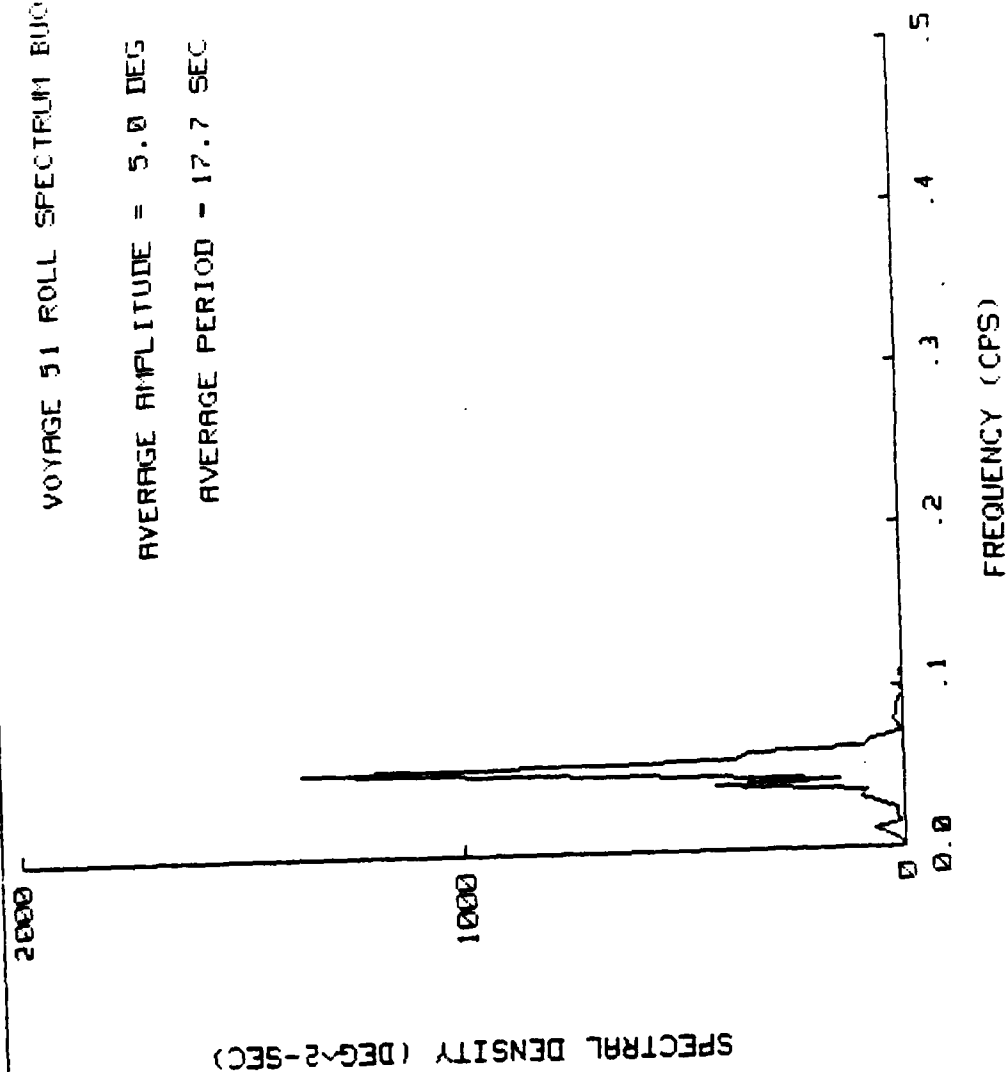
AVERAGE PERIOD = 8.0 SEC

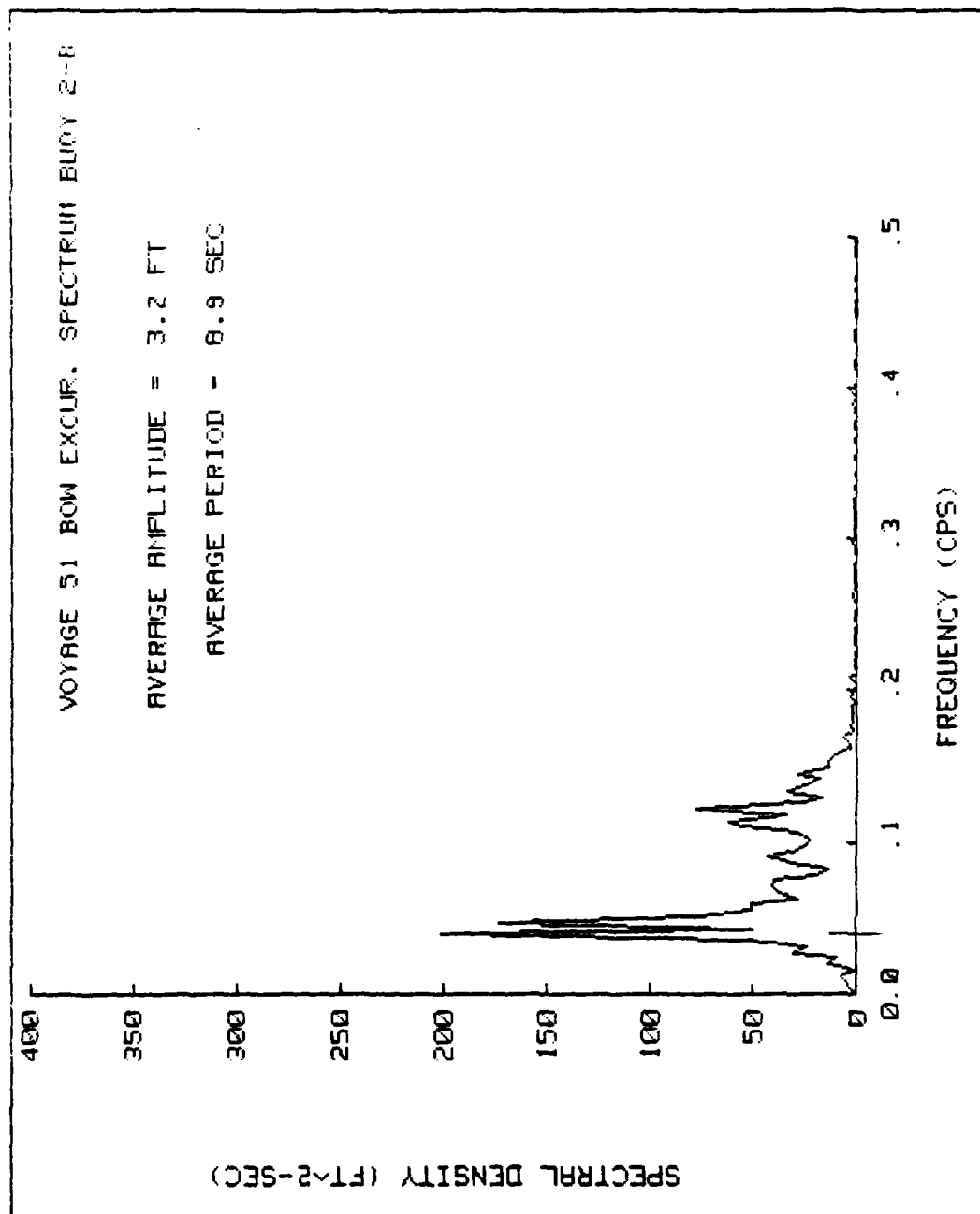


VOYAGE 51 ROLL SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 5.0 DEG

AVERAGE PERIOD = 17.7 SEC

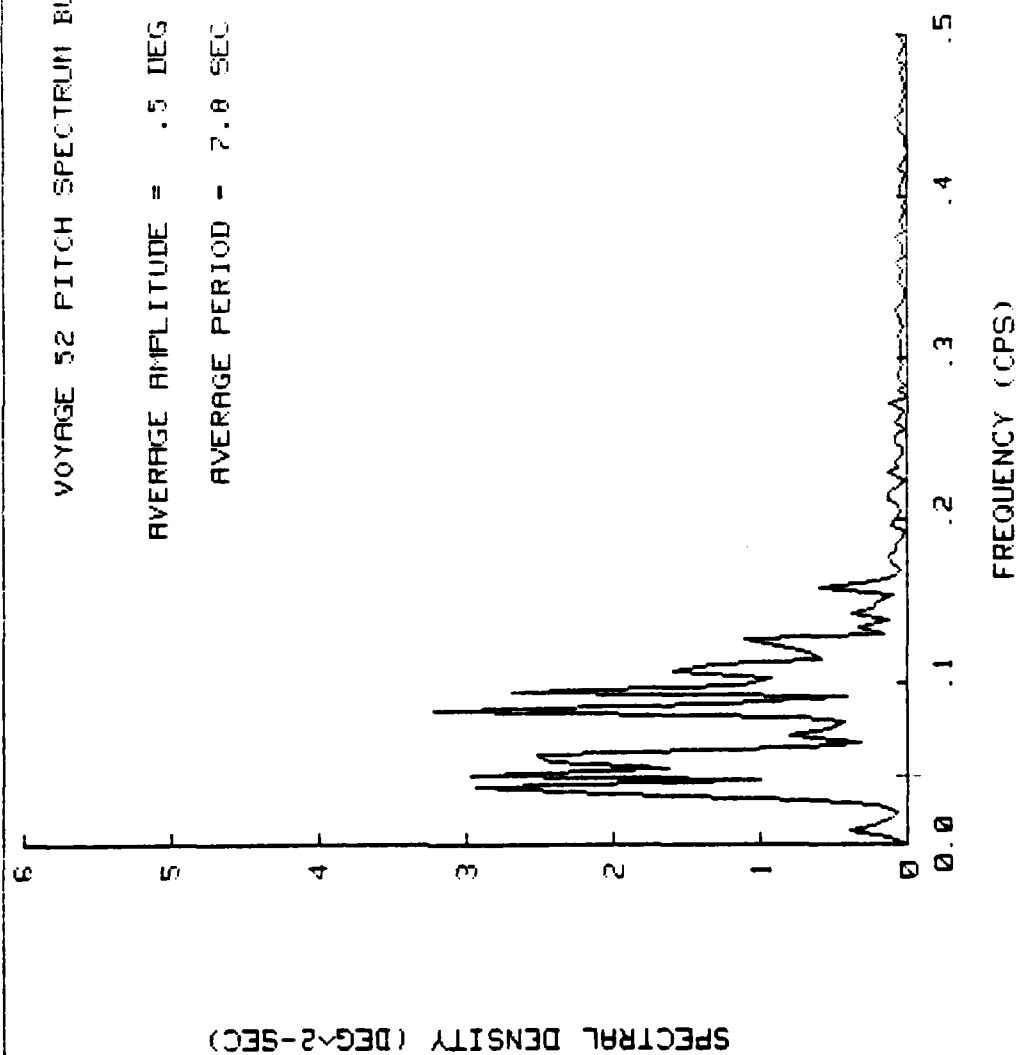


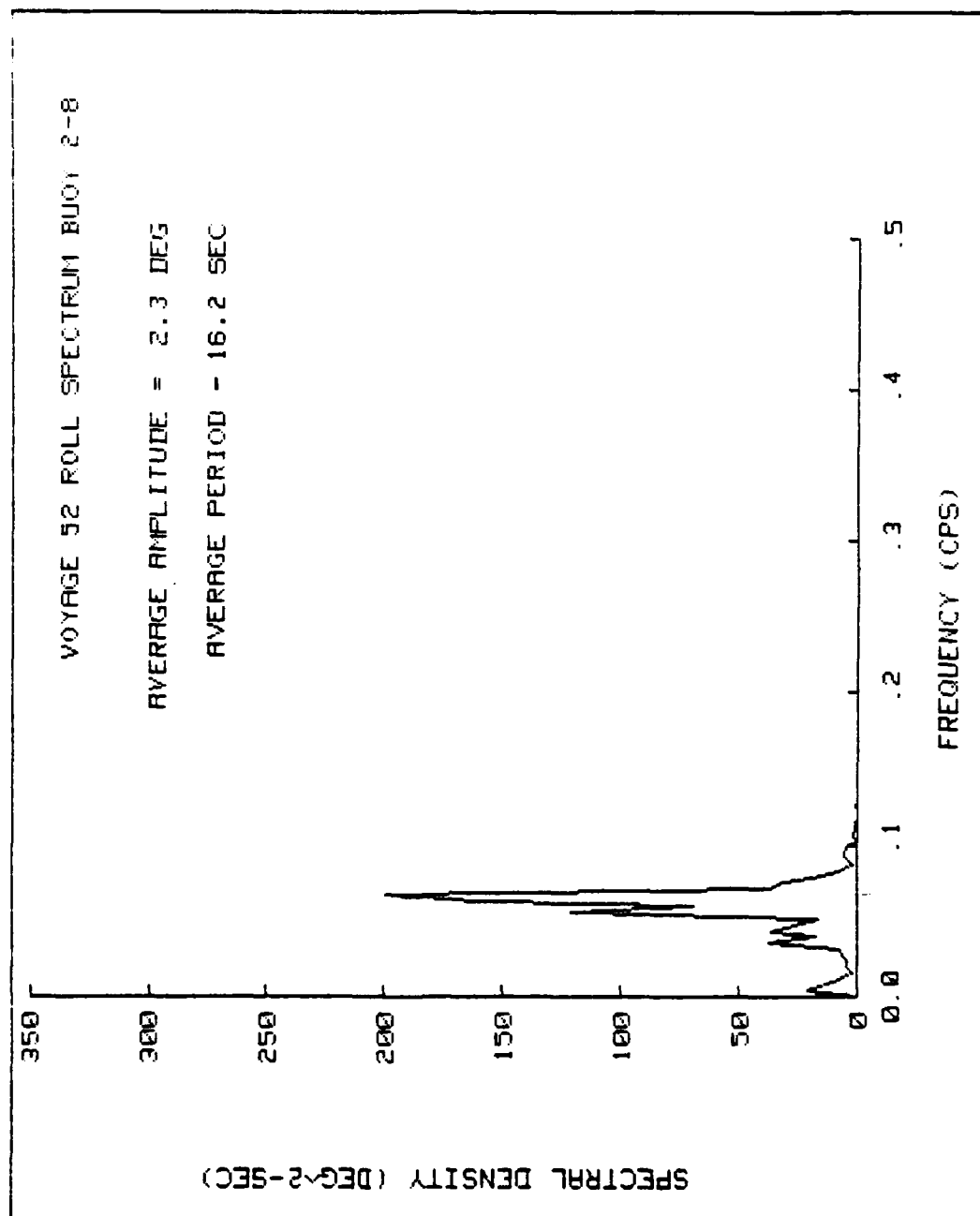


VOYAGE 52 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .5 DEG

AVERAGE PERIOD = 7.0 SEC

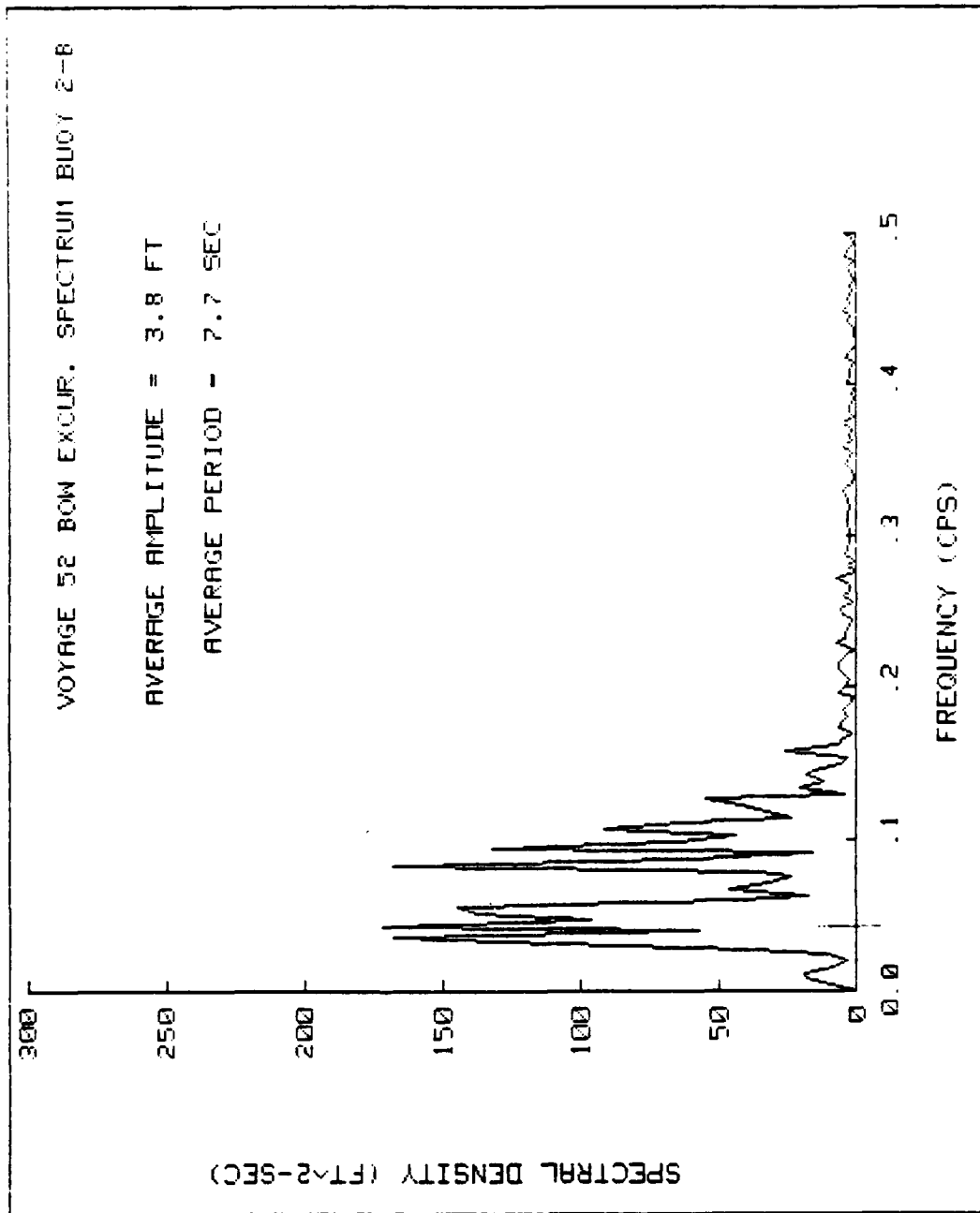




VOYAGE 52 BOW EXCUR. SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 3.8 FT

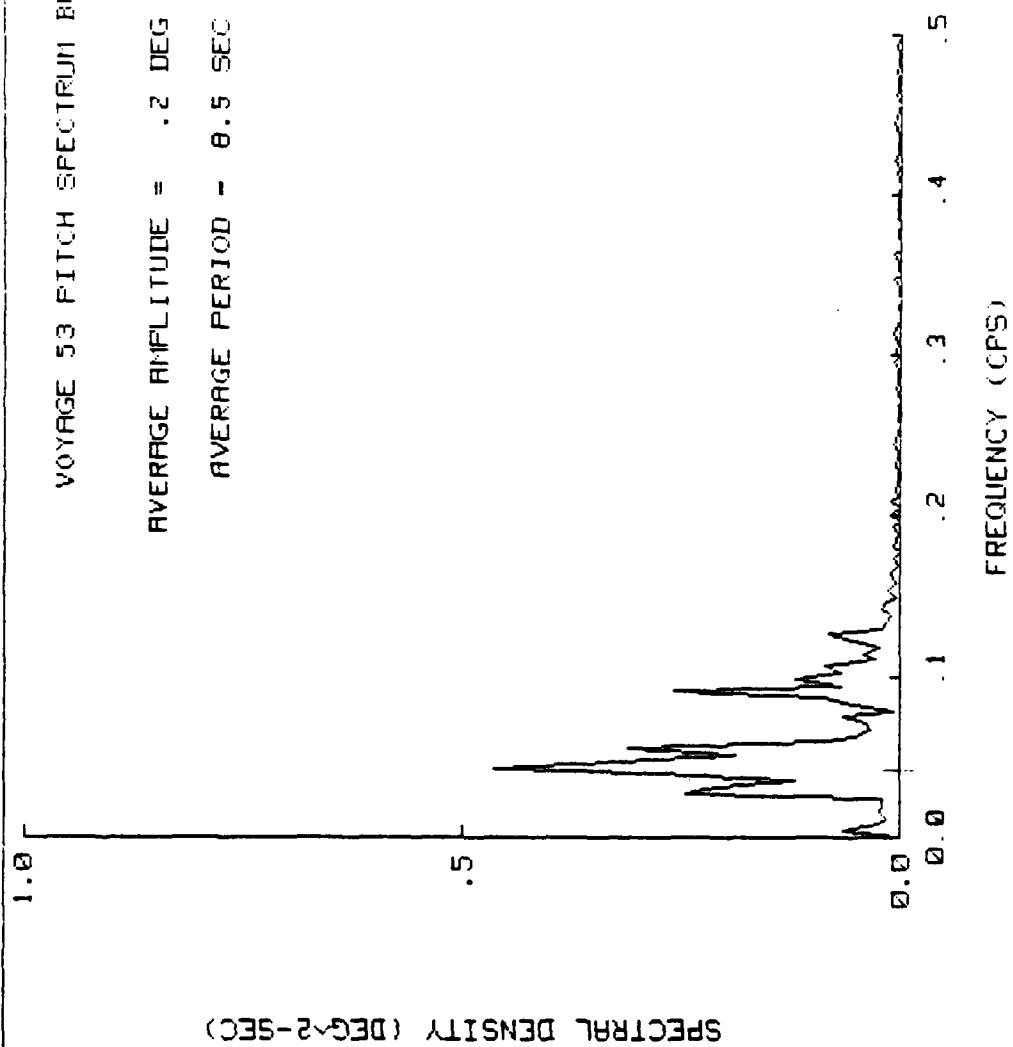
AVERAGE PERIOD = 7.7 SEC

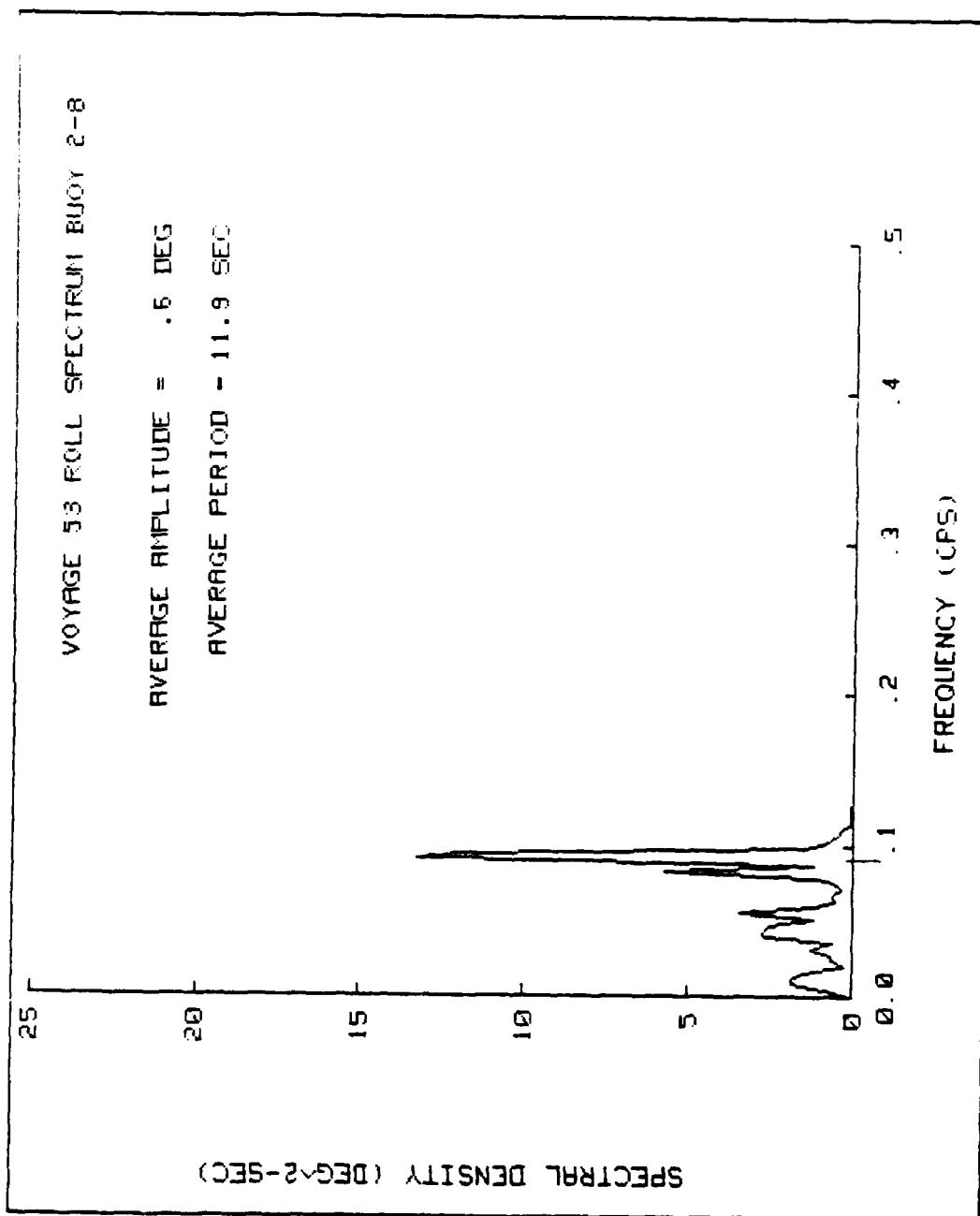


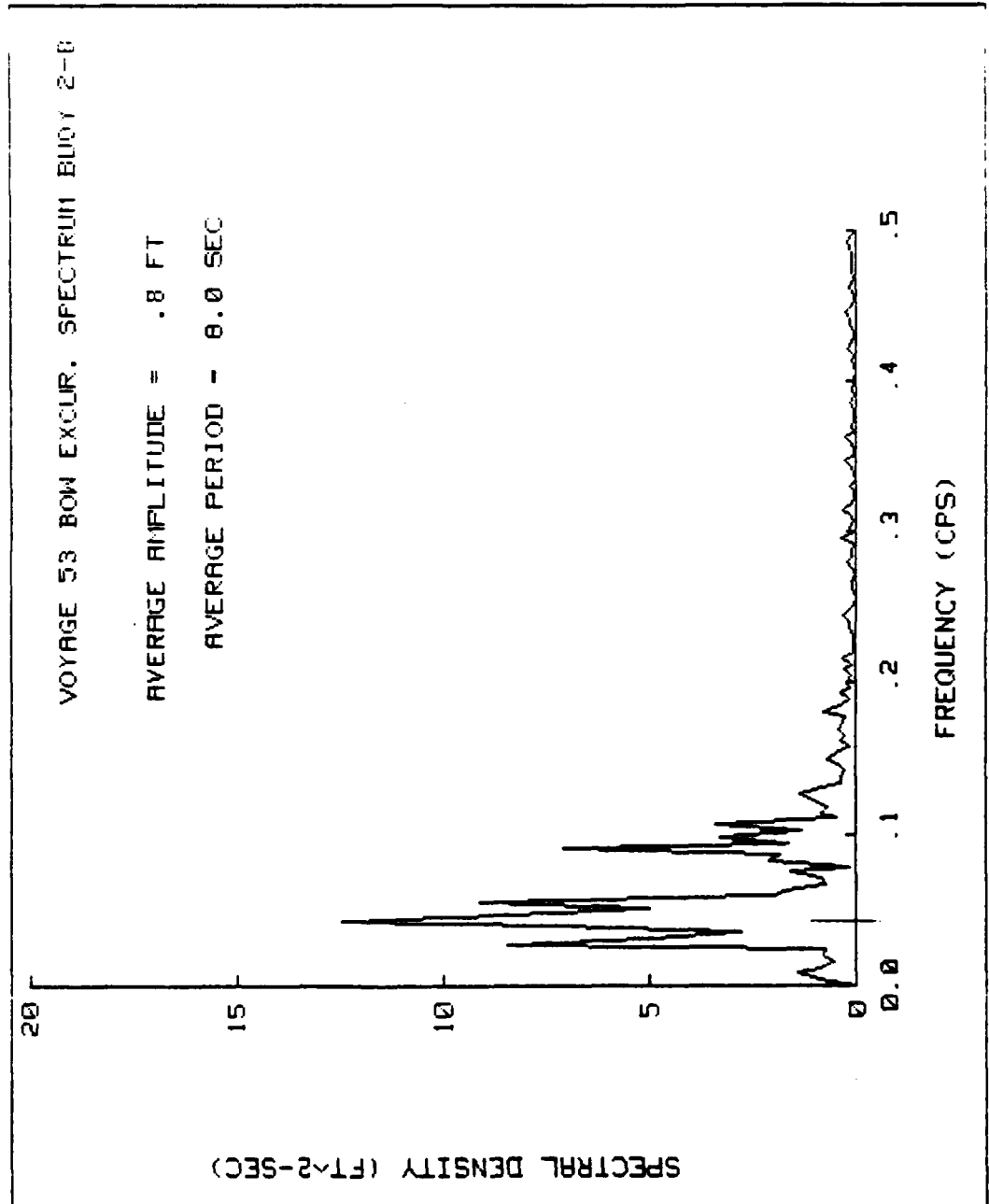
VOYAGE 53 PITCH SPECTRUM BUDDY 2-8

AVERAGE AMPLITUDE = .2 DEG

AVERAGE PERIOD = 0.5 SEC







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